

AGRICULTURAL CHEMICALS



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Sound Sales Practices

Potassium Nitrate in Crop Production

NAC Pesticide Report For 1960

C-VPPA Meets To Discuss Responsibility

Public Health Symposium Discusses Pesticides

Fertilizer Industry Round Table (Part II)

ESA Hears Recommendation for Closer Cooperation with FDA

Washington Horticultural Association Meets

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January 1961

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This Month's Cover

Gov. Orville L. Freeman of Minnesota replaces Ezra Taft Benson as Secretary of Agriculture this month in the Cabinet of President-elect John F. Kennedy. Gov. Freeman served two terms as Governor of Minnesota before losing that post in the 1960 elections. Gov. Freeman was graduated from the University of Minnesota and served with the Marines during World War II.



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January, 1961

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Chemicals Department

CARLOS KAMPMEIER

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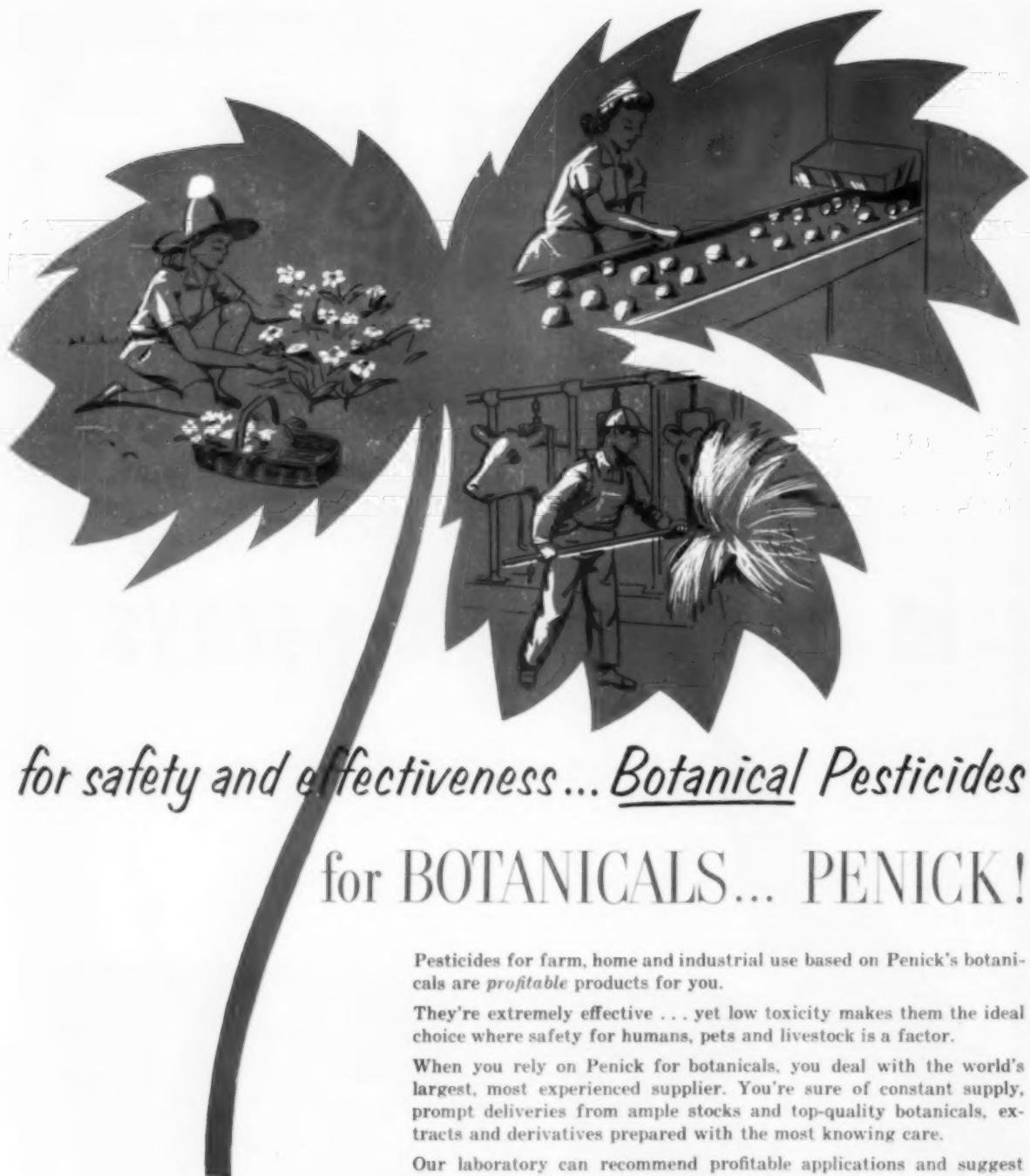
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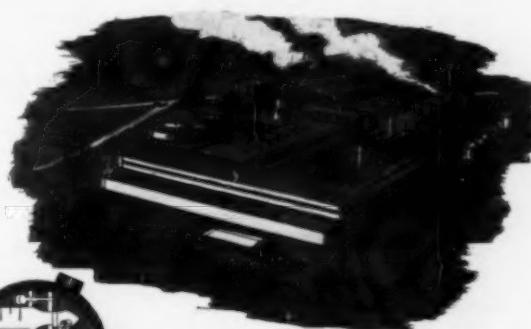
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Trade Listing

National Agricultural Chemicals Association, Association Building, 1145 19th St., N.W., Washington, D.C. Lea Hitchner, exec. sec.

National Plant Food Institute, 1700 K St., N.W., Washington, D.C. Paul Truitt, president.

American Potash Institute, 1102 16th St., N.W., Washington, D.C. H.B. Mann, president.

American Society of Agronomy, 2702 Monroe St., Madison, Wis. L.G. Monthey, exec. sec.

American Phytopathological Society, S.E.A. McCallan, secretary. Boyce Thompson Institute, Yonkers, N.Y.

American Chemical Society, 1155 18th St., N.W., Washington, D.C.

Association of Official Agricultural Chemists, P.O. Box 540, Benjamin Franklin Station, Washington, D.C. William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute, Hotel Claridge, Room 306, Memphis, Tenn. Jack Criswell, executive vice-president.

American Society of Agricultural Engineers, F.B. Lanham, secretary, 505 Pleasant St., St. Joseph, Mo.

Carolinians-Virginia Pesticide Formulators Association, 516 S. Salisbury St., Raleigh, N.C. Hugh Horn, secretary-treasurer.

California Fertilizer Association, Sidney Bierly, executive secretary, Room 213, Ochsner Building, 719 "K" Street, Sacramento, Calif.

Chemical Specialties Manufacturers Association, 50 East 41st St., New York City. Dr. H.W. Hamilton, secretary.

Entomological Society of America, 4603 Calvert Rd., College Park, Md. R.H. Nelson, secretary.

National Fertilizer Solutions Association, 2217 Tribune Tower, Chicago, Ill. M.F. Collie, secretary.

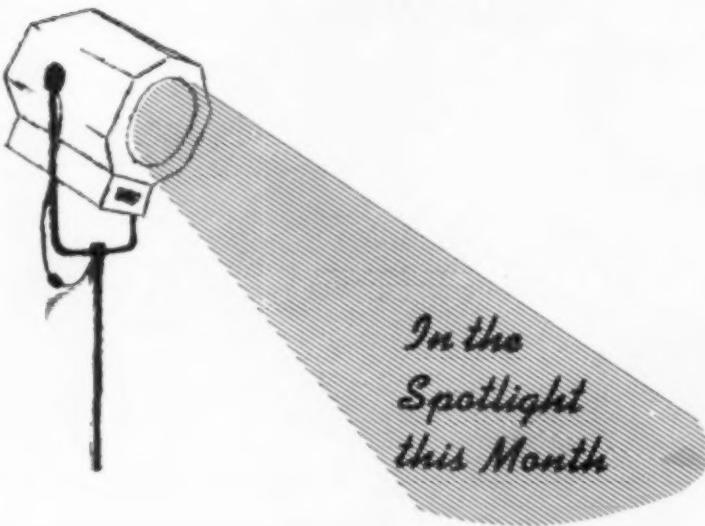
National Cotton Council, P.O. Box 9905, Memphis, Tenn.

Soil Science Society of America, 2702 Monroe St., Madison, Wis. L.G. Monthey, exec. sec.

Sulphur Institute, 1725 K St., N.W., Washington, D.C. Dr. Russell Coleman, president.

Weed Society of America, W.C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

Western Agricultural Chemicals Association, Charles Barnard, executive secretary, 2466 Kenwood Ave., San Jose, Calif.



● **Sound Sales Programs . . .** A close look is taken at some of the selling problems of the agricultural chemicals industry and possible solutions are suggested. Outlined is a successful program that was accomplished through teamwork on the part of the manufacturer, the distributor, and the dealer. Page 28.

● **Potassium Nitrate . . .** For certain crops and systems of fertilization, potassium nitrate would be useful as a supplement to or a replacement for muriate and sulfate of potash. The extent of its usage, however, is influenced by its availability to the manufacturer or grower. Page 30.

● **1960 Pesticide Sales . . .** Sales of pesticides in 1960 averaged three per cent over 1959 figures, according to the National Agricultural Chemicals Association. Sales trend of recent years is seen as indication that the industry's growth pattern may be leveling off into a steady climb. Page 33.

● **C-VPFA Annual Meeting . . .** The annual meeting of the Carolinas-Virginia Pesticide Formulators Association considers the topic of residues and improper pesticide use. Formulators are urged to assume responsibility for use and misuse of pesticides. Page 34.

● **Public Health Symposium . . .** Panel considering Public Health Aspects of Agricultural Chemicals agrees that the present hazard in using pesticides lies primarily in accidental poisoning by those using the chemicals. Page 39.

● **Annual ESA Meeting . . .** Because so many variables enter into a judgment as to whether a particular substance is or is not carcinogenic, it is recommended that a panel be formed to offer expert scientific advice to assist the FDA in decisions concerning pesticide residues. New insect control methods also are discussed. Page 41.



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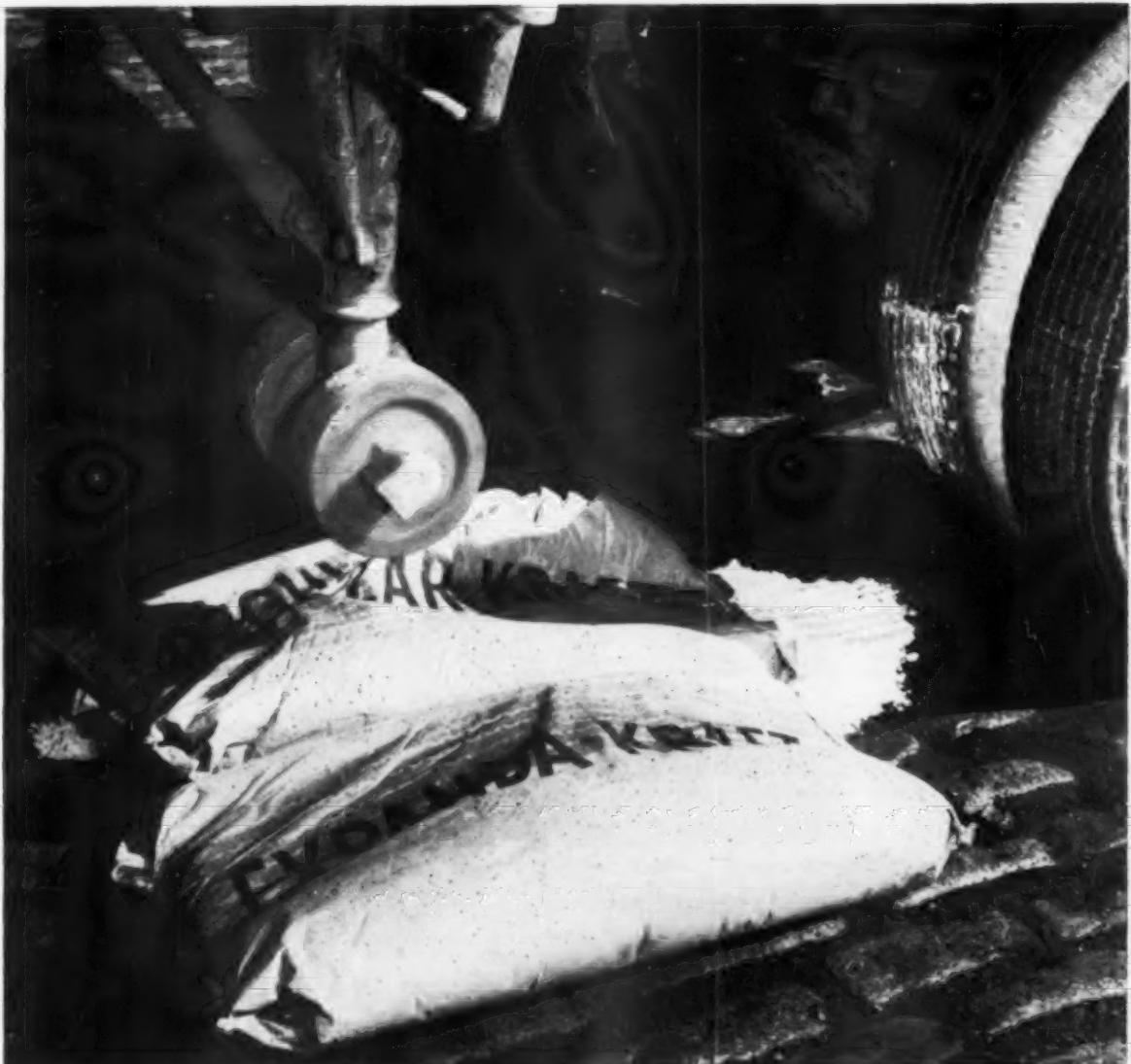
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LITERATURE AVAILABLE

The bulletins listed below are available from the organizations by which they are prepared.

Peanuts . . . Suggestions for Insect Control in Farmers Stock Peanuts, by USDA Agricultural Marketing Service. 12 pages. Bulletin AMS-337, September, 1959. Discussion of the insect problem, principles of insect control, general considerations, formulations for suggested control procedures. USDA, ARS, Washington, D. C.

AC

Insect Detection . . . Keeping an Eye Out for Insects, by USDA, Office of Information. 4 pages. Bulletin No. 120, September, 1959. USDA, Office of Information, Wash., D. C.

AC

Pesticide Screening . . . Screening Tests of Compounds for Toxicity to the Southern Potato Wireworm, by F. P. Cuthbert, Jr., and W. J. Reid, Jr. 8 pages. Bulletin ARS-33-54, July, 1959. Various compounds tested and compared with DDT. Chemical compounds and tables listed. USDA, ARS, Wash., D. C.

AC

Repellents . . . Laboratory Evaluation of Promising Compounds as Repellents to Flour Beetles *Tribolium Spp.*, by U. S. Dept. of Agriculture—Marketing Research Division, Marketing Research Report No. 324, April, 1959. 46 pages. Discussion of the procedure and results for various compounds. Appendix showing list of chemicals and their own repellency. Price 25¢. Supt. of Documents, Wash., D. C.

AC

Weeds in Spinach . . . Studies of Chemical Weed Control in Spinach, by W. R. Kays and Charles Galeotti, Processed Series P-330, September, 1959. 7 pages. Discussion of spring planting of spinach and its treatment by six chemical compounds; the results, plus compounds used, are available, along with rating of the treatment in table form. Oklahoma State Univ., Agricultural Exp. Station, Stillwater, Okla.

AC

Public Relations . . . Public Relations or Peasantry, by E. Lipscomb, January, 1960. 52 pages. The problems of present public relations, pitfalls and fallacies in seeking solutions, a positive program in three essential parts, abbreviated blueprint for local promotion, and samples of facts the public should know are all discussed. National Cotton Councils of America, Memphis, Tenn.

AC

Systemics for Peanuts . . . Systemic Insecticides for Thrips Control on Peanuts, by W. G. Eden and C. A. Brogden. 3 pages. Progress Report Series No. 77, January, 1960. Suggestions for the control of thrips. Auburn Univ., Agricultural Exp. Sta., Auburn, Ala.

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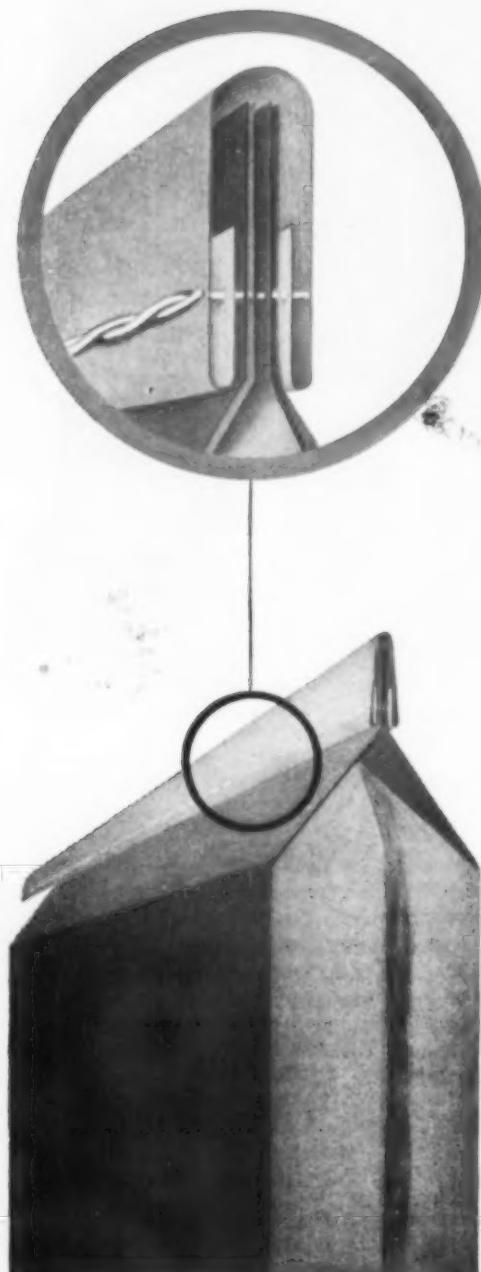
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*Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications.

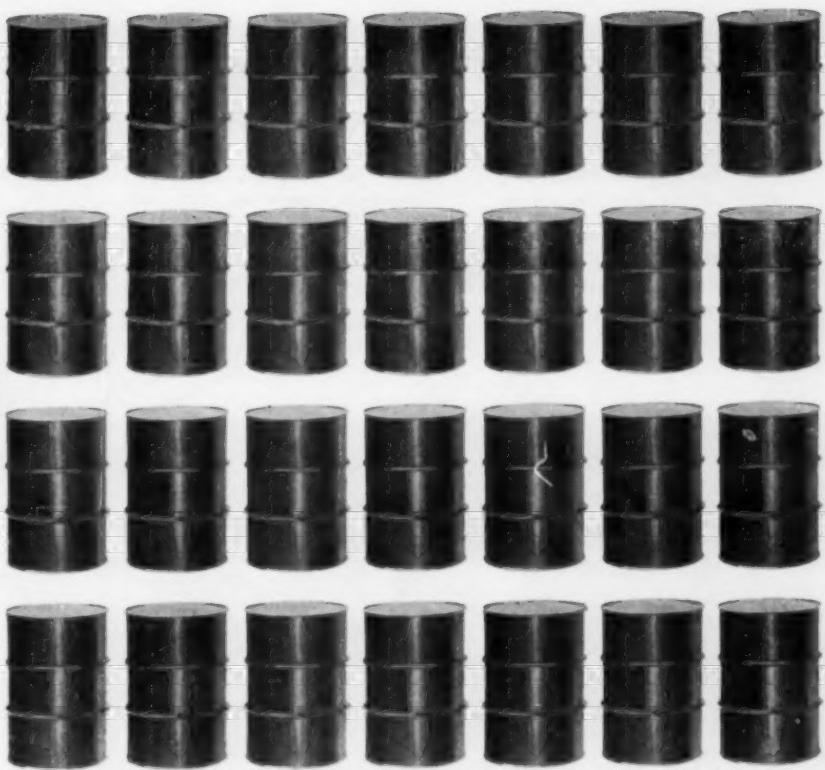
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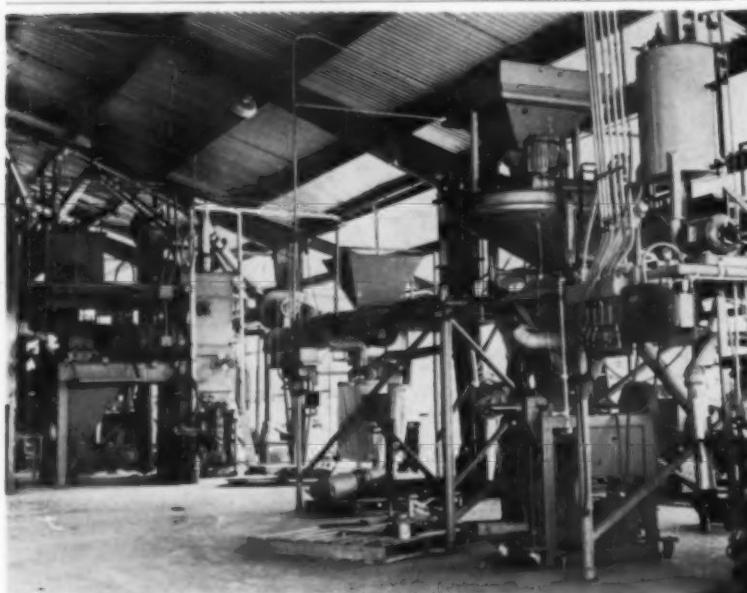
INDUSTRY MEETING CALENDAR

Jan. 4-6—Northeastern Weed Control Conference, Hotel New Yorker, New York.

Jan. 5-6—Wisconsin Pesticide Conference With Industry, Memorial Union, University of Wisconsin, Madison.

Jan. 5-7—California Aerial Applicators Association, 11th Annual Convention, El Dorado Hotel, Sacramento, Calif.

Jan. 10-11—Fertilizer Dealers Short Course and Fertilizer Industry Representatives Conference, Memorial Union, Iowa State University, Ames, Iowa.



The IMPINGATRON Continuous Blender is shown in the right foreground of this view of the new Arizona Pest Control plant in Glendale, Arizona.

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**O'Brien Industrial Equipment Company
Manufacturing Engineers**

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VAlencia 6-3033

Jan. 11-13—Beltwide Cotton Production-Mechanization Conference, Poinsett Hotel, Greenville, S. C.

Jan. 12—Clemson College Fertilizer Meeting, Wade Hampton Hotel, Columbia, S. C.

Jan. 12-13—Arizona Aerial Applicators Association, 8th Annual Meeting, The Wigwam, Litchfield Park, Ariz.

Jan. 18-19—WACA Northwest Conference (formerly Northwest Agricultural Chemicals Industry Conf.) Benson Hotel, Portland, Ore.

Jan. 18-20—Southern Weed Conference, Hotel Sorenco, St. Petersburg, Fla.

Jan. 18-21—Mississippi Aerial Applicators Association, annual convention, Buena Vista Hotel, Biloxi, Miss.

Jan. 19-20—14th annual Southern Farm Forum, Roosevelt Hotel, New Orleans, La.

Jan. 24-26—13th Illinois Custom Spray Operators' Training School, Illini Union Building, University of Illinois, Urbana.

Jan. 23-25—Southeastern Branch, Entomological Society of America, annual meeting, Admiral Semmes Hotel, Mobile, Ala.

Jan. 24-26—California Weed Conference, Californian Hotel, Fresno, Calif.

Jan. 25-26—TVA Symposium on "Effects of Environment on Crop Response to Fertilizers," Muscle Shoals, Ala.

Jan. 26-27—Colorado Agricultural Chemicals Association, annual meeting, Cosmopolitan Hotel, Denver, Colo.

Jan. 26-27—Louisiana Aerial Applicators Association, Seaman A. Knapp Hall, LSU, Baton Rouge.

Feb. 6-8—Association of Southern Agricultural Workers, Agronomy Section, Mississippi State University, State College, Miss.

Feb. 14-15—Aquatic Weed Control Society, 2nd Annual Meeting, LaSalle Hotel, Chicago.

Feb. 14-16—8th annual Agricultural Chemicals Conference, Texas Technological College, Lubbock, Texas.

Feb. 15—Pesticides Review for Coastal Counties, San Luis Obispo, Calif.

Mar. 13-15—Spring Meeting, Western Agricultural Chemicals Association, Disneyland Hotel, Anaheim, Calif.

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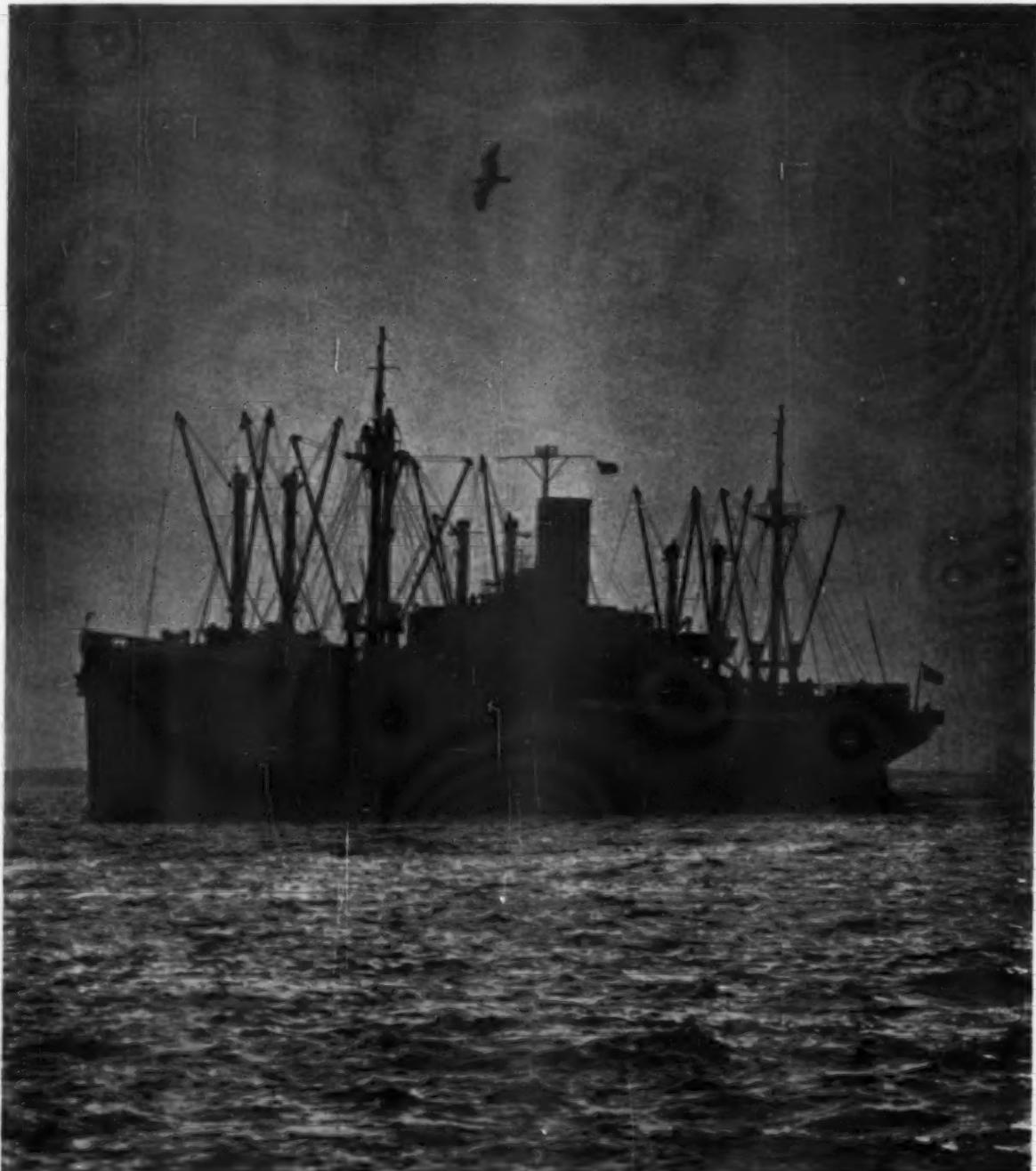
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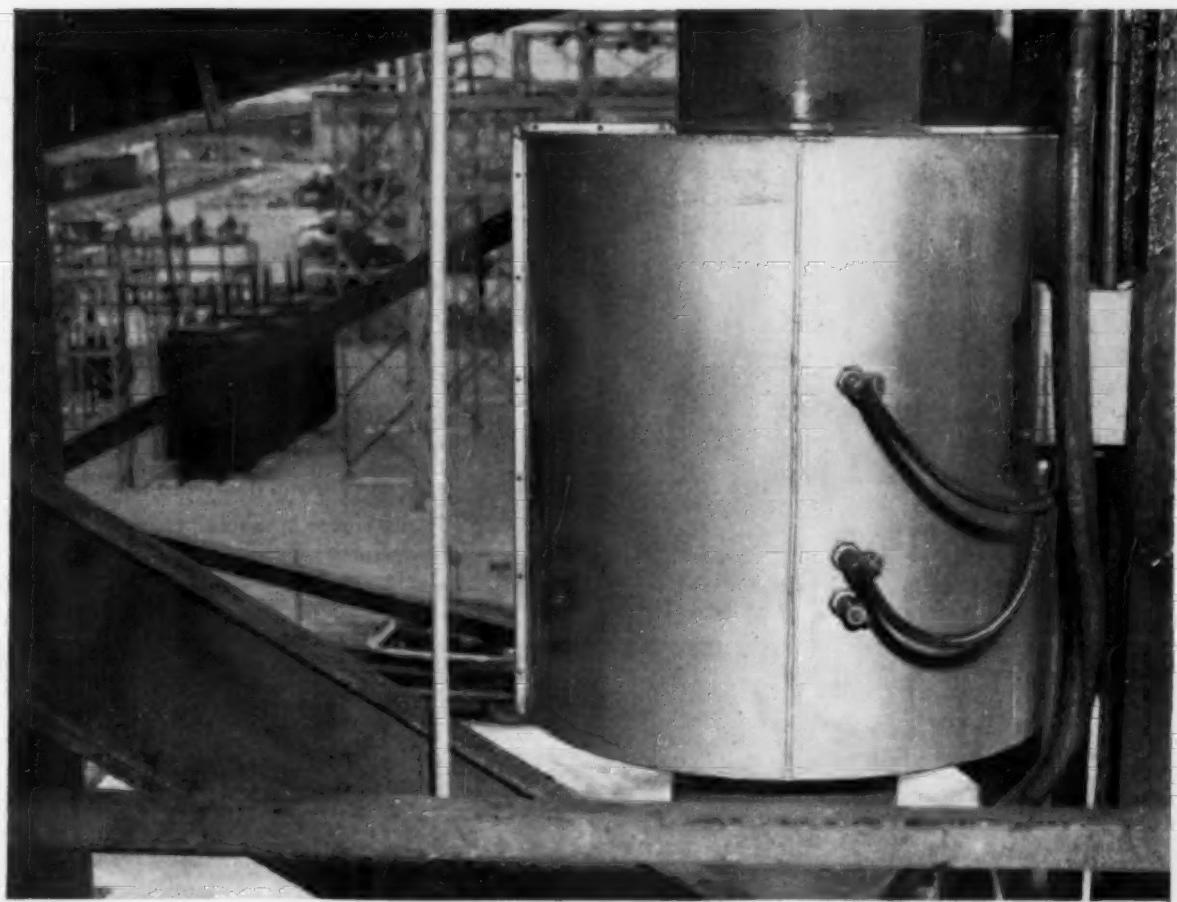
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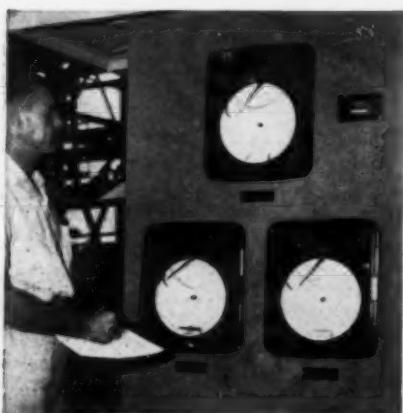


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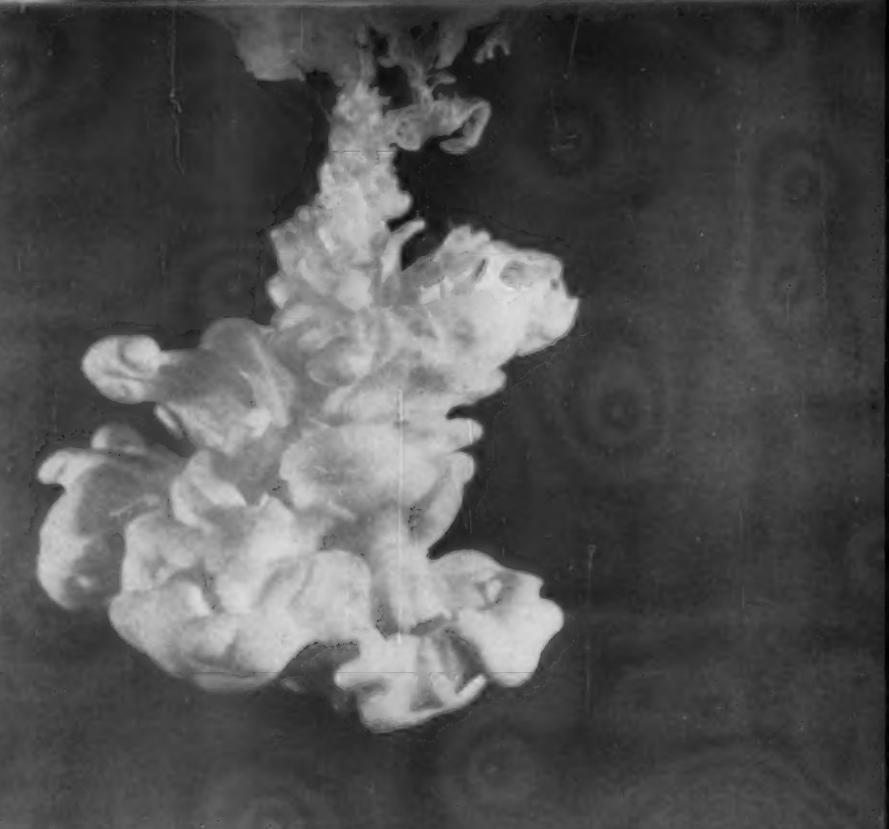
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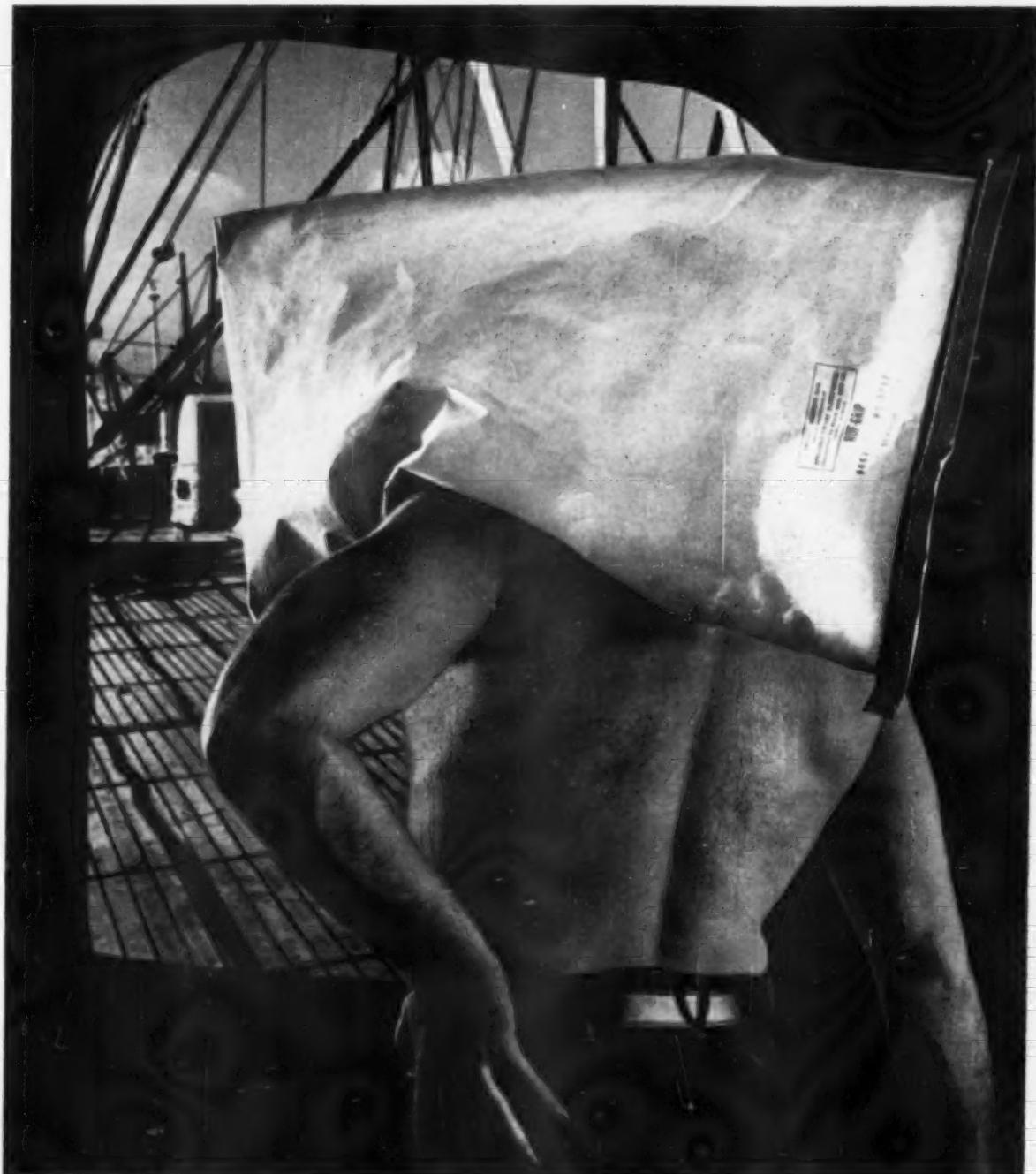
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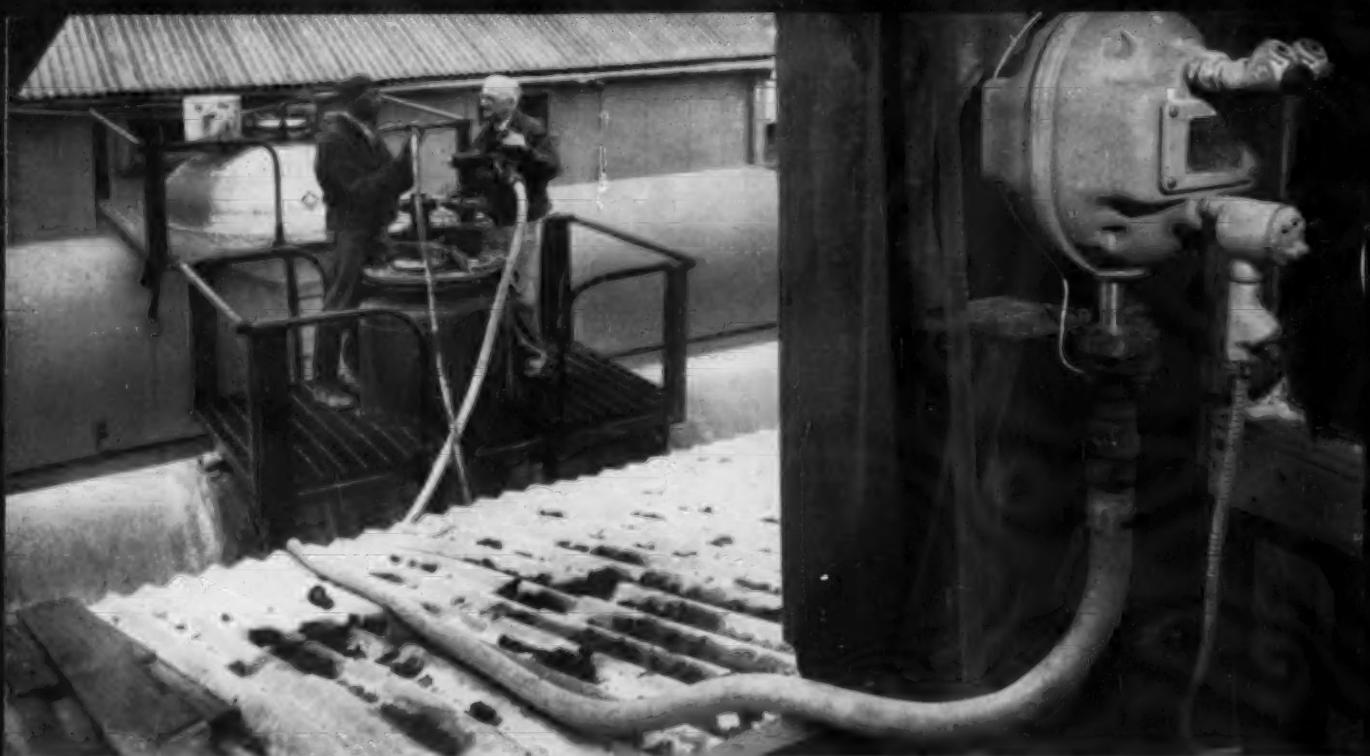
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GUEST EDITORIAL



CAN CONSIGNMENT BE STOPPED?

by W. R. Wood

Wood Chemical Co.
Lubbock, Texas

I AM convinced consignment can be stopped. At the beginning of the 1960 season, our company offered materials on a firm sale—no-take-back—basis only. Surprisingly to some, the dealers' reaction was favorable. Nine out of ten dealers realized that here finally was the means of eliminating the competitor who sold chemical at cost as a "come-on" to some of his other lines. When it meant investing his money in inventory, however, the competitor no longer was interested in selling at cost. It was this tenth dealer who instigated consignment. He began by putting pressure on his supplier, and, if this did not work, he went to other suppliers, playing one against the other. In some cases, one supplier would break, thus giving the other supplier a reason to break to another dealer, and resulting in a chain reaction. This is one of the three weak links in the program. Members of the industry must be able to withstand pressure from dealers and be ready to sacrifice an occasional sale if the program is to prove successful.

Generally speaking, members of the industry from other areas respected and supported our program. However, there always are a couple of rotten apples in every barrel. People who cannot sell on a competitive basis and look for an unethical ad-

vantage. Usually their product is inferior and they offer no service. It is our contention that companies such as these are not an important factor and are limited to a few spot sales at a low price. Therefore, if the permanent operators in the area will ignore them, they will not affect the overall picture. This is Problem Number 2.

Problem Number 3 is "rumor." A salesman hears by the grapevine that a competitor's salesman has lowered the price or offered consignment. He immediately puts pressure on his boss to let him meet a situation that probably did not exist. Another situation can occur when a salesman loses an account. His first thought is that whoever got the account must have cut the price, or offered consignment, or else the customer did not pay his bill. In my opinion, price and terms of sale are near the bottom of the list. Quality and service head the list, followed closely by better salesmanship, reciprocity, personalities, and a dozen other variables.

In summing up the degree of success achieved during the 1960 season, our company's program was 75% effective. This is a pretty good batting average for the first season. With this start, and the confidence we have developed between competitors, we expect to reach the 100% goal in 1961.

"The Weakest Link"

Sound Sales Programs: The Industry's Greatest Need

Because of the tremendous investment in time and capital behind every agricultural chemical, sales programs must be sound. They must effectively communicate to the grower the advantages each new chemical holds out to them.

by Gerald L. Dennis

Field Sales Manager,
Naugatuck Chemical Division
United States Rubber Company

THE weakest link in the chain stretching from the research laboratories, where our agricultural chemicals are born, to the farm, where they are put to use, is the industry's marketing section. Before taking a close look at some of the marketing problems of the industry, and suggesting possible solutions, however, it will be worthwhile to dwell for a moment on the industry and the world in which it is operating.

American agriculture currently is producing more than enough food materials for our nation, despite the fact that only 12 per cent of our nation's population work and live on farms, compared to 60 per cent in many foreign countries where food shortages exist. This condition exists, too, in the face of a decline in the number of farms from 5.6 million in 1950 to 4.6 million in 1959.

The factor, of course, that is behind the record of soaring outputs on this nation's farms, when the amount of land being farmed is declining, is agricultural chemicals. Back in 1940, there were seven or eight chemicals that possibly could create residue problems in use on farms, and, because the problem they posed was relatively minor, little attention was paid to them by government regulatory agencies. Today, that picture has changed radically. There are probably 600 brand name agricultural chemicals on the market, all of which require precise formulation and application for residue control and crop safety. Today, too, the United States Department of Agriculture and the Food and Drug Administration closely supervise the sale of agricultural chemicals.

Bringing an agricultural chemical to the market today is an elaborate procedure that requires an extensive outlay of capital and a heavy investment in time. Knowledge of this procedure is fundamental to planning a marketing program for agricultural chemicals.

Generally, as many as 4-to-5,000 chemicals are synthesized and screened, over a period that may last as long as four years, before a single chemical with commercial possibilities is uncovered. Once the selection of this commercially-possible chemical has been made, then the manufacturer must begin

formulation work, greenhouse and field testing, and toxicology screening. This step in the birth of an agricultural chemical may consume two to four years. But, even at this point, the work necessary to put this new chemical on the market is just barely underway.

Methods of determining residues must be found and long-term toxicological tests on animals must be started. Meanwhile, a pilot plant may be constructed so that larger quantities of the chemical can be produced, and broader field trials begun. At this point, a manufacturer may start enlisting the cooperation of university experiment stations and extension services in testing the new chemical, a vital necessity in the future marketing of the chemical.

Two to three years later, with toxicological tests and extensive field testing completed, the manufacturer can apply for a label on his new chemical. If the label is granted, the manufacturer is ready to take the chemical to the agricultural market—where it will be purchased if it provides benefits and an economic advantage.

In other words, a single pesticide can require as much as 10 years of experimentation, plus the expenditure of approximately \$1.5 million, before it is ready for the market. Then if all goes well—if pests don't develop a tolerance to it, or it isn't made obsolete by the development of still another pesticide—the manufacturer will

have seven to eight years of commercial protection before the chemical's patent expires.

This is the background against which marketing programs for agricultural chemicals must be planned. This tremendous investment in time and capital is the reason why such programs must be sound, why they must effectively communicate to the grower the advantages this new chemical holds out to him.

But how effective a marketing job is being done today by many agricultural chemical formulators and distributors? Not too long ago I visited a 12,000-acre food and fiber ranch in the San Joaquin Valley of California, and had a conversation with the professional entomologist whose responsibility is the use of agricultural chemicals on this ranch. He told me that his major problem was misapplication of chemicals by custom applicators. He said that these men had difficulty in understanding the labels on the chemicals, and that most of the crop damage and failure to control pests on the ranch could be traced directly to incorrect chemical application.

If this is happening on a ranch run by a professional entomologist, what must be happening on farms where there is no professional supervision? I would imagine that 99 per cent of all damage to crops and the lack of pest control now attributed to agricultural chemicals is the result of misapplication. In a larger sense, it is also the result of poor marketing programs because we in the marketing branch of our industry have failed to communicate sufficient information about these new chemicals to the grower.

There are, unfortunately, a good many distributors and dealers who are negligent in their marketing policies and programs, and whose motto seems to be: Take all the profit you can without extending any effort, for when interest in one agricultural chemical diminishes the researchers always are ready with a new miracle material.

This type of thinking, obviously, has no place in today's marketing of agricultural chemicals. If our industry is going to continue to advance, and continue its record of service to agriculture, then its products must be marketed with the same expenditure of scientific skills that go into their development.

Let me outline, now, what I consider to be the fundamentals of a sound marketing program for agricultural chemicals. The primary consideration is that all of the segments of our industry, and specifically, its marketing arm, must realize that our business has no other basis than to serve the genuine needs of the grower. With this in mind, we must: (1) Give the farmer an economic advantage over a current practice, (2) Provide him with a product that can be used safely, (3) Provide him with an easy method of applying it, (4) Provide the dealer who is to handle the product with adequate profit to carry this item, and also the information to promote and sell it, (5) Provide adequate profit for the distributor, plus product knowledge, so that he can instruct his dealers and encourage them to promote the product, and (6) Provide a margin of profit for the manufacturer so that the cycle can be perpetuated.

In this regard, and to cite an example, I would like to describe the marketing program that my own company uses for MH-30, or maleic hydrazide, which is used by tobacco farmers to control the growth of suckers on their tobacco

plants. About five years ago, when commercial use of this product began, many instances of misapplication occurred. In fact, after just one year of commercial use, this very useful chemical was on the verge of economic oblivion.

After carefully looking into the situation, we decided that the bulk of the blame could be assigned to our marketing program. We found that many of the distributors and dealers handling the product were rapidly becoming disinterested due to overlapping territories, and several other factors, including lack of information on the part of both distributors and dealers on the chemical. An overhaul of our marketing program for this product, consequently, was vital.

As a first step we instituted a survey of the areas in which the product could be sold. Coupled with this survey was a series of interviews with growers. From this we learned where the chemical could be sold, and the type of information that the grower needed before he would purchase it. We also analyzed the general performance of distributors and dealers in these areas.

Our salesmen, who aided in this survey, were asked to evaluate distributors and make firm recommendations on the distributors they felt could do the best job in handling the product. After these reports were in, we revised our territorial distribution for the chemical, dropping some distributors and taking on new ones. We

(Continued on Page 79)

Bringing an agricultural chemical to the market today is an elaborate procedure. Knowledge of this procedure is fundamental to planning a marketing program. The primary consideration, however, is to serve the genuine needs of the grower.

Potassium Nitrate IN CROP PRODUCTION

With its excellent physical properties, potassium nitrate should be useful in the manufacture of fertilizers for tobacco and potatoes in that it provides a source of nitrate nitrogen as well as potassium that

is low in chlorine and sulphur. Potassium nitrate also has a potential in the fertilization of crops grown in greenhouse cultures where abnormally high rates of fertilizers frequently are used.

by C. B. McCants

Soils Department
North Carolina State College

POTASSIUM nitrate as a fertilizer material has been of interest to agronomists for many years. This interest has arisen from the fact that it is a carrier of two of the principal elements applied in fertilizers, potassium and nitrogen, (approximately 46% K₂O and 13% N) and because it provides a source of potassium that is relatively free of sulphur and chlorine. Furthermore, the excellent physical properties of potassium nitrate make it an excellent material for use in manufacturing mixed fertilizers or for direct application to the soil. In the discussion that follows, a review is made of the results from some of the research that is relevant to the use of potassium nitrate in crop production.

The solubility of potassium nitrate in water at the temperatures for normal growth of most plants is approximately the same as that of potassium chloride, but somewhat greater than that of potassium sulphate. In dissolving in the soil water, potassium nitrate dissociates into the positively negatively charged nitrate ion. The charged potassium ion and the

reactions of potassium ions, per se, with the soil, or their absorption by the plant would not be expected to differ between the sulfate, chloride or nitrate sources. Likewise, the availability of nitrate nitrogen to plants and its susceptibility to leaching would be expected to be the same whether it were obtained from sodium, ammonium or potassium nitrate.

This supposition regarding the availability to plants of potassium in potassium nitrate is supported by data which show that when the rate of sulphur, chlorine and essential elements other than potassium is held constant, the yield of tobacco where potassium nitrate is the source of potassium is not measurably different from that obtained from chloride, sulfate or carbonate sources (10, 20). Work with potatoes has also shown that at comparable rates of potassium, similar yields were obtained from the sulfate, chloride and nitrate sources (14). As a source of nitrate nitrogen, potassium nitrate resulted in yields of tobacco similar to that from sodium nitrate (16). Thus it is clear from both theoretical considerations and ex-

perimental data that the availability to plants of potassium and nitrate nitrogen in potassium nitrate is similar to that in other sources of these elements commonly used in the fertilizer trade.

Plant Response

While there is no difference between the chloride, sulfate and nitrate sources of potash on the potassium effects as such, there may be a difference between the sources on plant response due to the associated anion. For example, the use of muriate of potash on a number of crops is restricted because of the adverse effect of excessive chlorine on quality. The most notable of these crops are potatoes and tobacco. A number of experiments have been conducted in which the effects of potassium chloride and potassium sulfate on the quality of potato tubers have been studied. Potassium nitrate was included in some of these studies. These investigations have shown, in general, that the chloride source as compared to the sulfate or nitrate source resulted in a decrease in the specific gravity, dry matter and starch content of the

tubers (2, 3, 7, 14). These effects are generally associated with a reduction in tuber quality. As a result of the effects of chlorides on quality of potatoes, in many of the commercial potato growing areas it is recommended that the potassium be obtained from the sulfate source. When using fertilizer mixtures prepared from sulfate of potash and ordinary superphosphate, and applying them at rates commonly employed in potato production, quantities of sulfate sulphur are applied to the soil considerably in excess of that required by the plants for normal growth. While the effects of this excessive sulfate sulphur on the yield and quality of potato tubers has not been studied extensively, a tip burn associated with high sulfate sulphur in the presence of ammonium nitrogen has been reported (6). Additional information is needed on the influence of excessive sulphur on both the yield and quality of potato tubers. Investigations of this nature are planned.

Effect of Chlorine

The effect of chlorine on the quality of tobacco has been reported by many investigators. The data show that generally as the percentage of chlorine in tobacco is increased, the green leaves frequently become thickened and brittle and roll upward at the leaf margins. When cured, the leaves are dull in appearance and soggy, and associated with this condition is a reduction in the duration of burn (1, 5, 12). This effect of chlorine on the burning characteristic of tobacco is so pronounced that there are laws in many states which regulate the maximum percentage of chlorine permissible in fertilizers for tobacco. Potassium, however, tends to improve leaf burn and consequently relatively high rates are generally used in the production of tobacco. The demand for high rates of potassium along with the chlorine restriction has necessitated that a large part of the potassium in tobacco fertilizers be obtained from potassium

sulfate and potassium-magnesium sulfates. Both of these materials contain considerable sulphur, as do ordinary superphosphate and ammonium sulfate, which are used in fertilizer formulations. The sulphur content of current mixtures used for fertilizing flue-cured tobacco, consequently, is from 20 to 30 per cent SO_3 equivalent and the rates applied to a given crop are frequently equivalent to 300 to 500 pounds of SO_3 per acre. Research with both flue-cured (13) and cigar-type tobacco (12, 19) has shown some detrimental effects of excessive sulfates on leaf burn. The results have recently been reported from investigations with cigar-type tobacco in which the same acre rates of potassium were applied from sulfate, carbonate and nitrate sources. While the yield and quality scores of tobacco from the different sources were not significantly different, the leaf burn of the tobacco from the potassium nitrate or the potassium carbonate treatments was significantly higher than that from the potassium sulfate treatment. Although the effects of sulphur on lowering the quality of tobaccos does not appear at present to be as severe as those of chlorine, there is, nevertheless, a growing interest in practical methods of lowering the rates of sulphur applied, without at the same time reducing the rates of potassium.

Soil Fumigants

Recently it has been shown that certain of the soil fumigants used for the control of nematodes in tobacco reduce the rate of conversion of ammonium to nitrate nitrogen (9). The growth and development of tobacco is known to be adversely affected when the major portion of the available nitrogen is in the ammonium form when compared to the growth with nitrate nitrogen (4, 11). With the inhibitory effects of fumigation on nitrification, it has been found profitable to apply some nitrate nitrogen in the fertilizer and, therefore, it is now recommended that fertilizers for flue-cured tobacco con-

tain at least 30 per cent of the nitrogen in the nitrate form (15).

Nutritional Leaf Roll

Another crop in which some nitrate nitrogen is necessary in the medium for normal growth is potatoes. In Irish potato production a growth abnormality, which has been referred to as "nutritional leaf roll" (17, 18), has been associated with high ammonium and low nitrate nitrogen levels in the soil. The leaf symptoms are similar in appearance to those of chloride toxicity in tobacco. Greenhouse investigations have suggested, however, that leaf roll in potatoes is related to both the chlorine level and the form of nitrogen in the growth medium in that the leaf roll was obtained only with chloride treatments in the presence of ammonium nitrogen (6). It was not observed when ammonium was used in the absence of chlorides or when nitrates were added in the presence of chlorides. In many of the Coastal Plain areas, potatoes are grown in acid soils with poor drainage and during the cool seasons. Under these conditions nitrification of ammonium nitrogen would be low and therefore some nitrate nitrogen in the fertilizer would seem desirable. With its excellent physical properties, potassium nitrate should be useful in the manufacture of fertilizers for tobacco and potatoes in that it provides a source of nitrate nitrogen and also a source of potassium that is low in chlorine and sulphur.

Split Application

In many areas, the practice of split application of fertilizer to tobacco is gaining in importance. The general procedure is to apply a portion of the fertilizer prior to transplanting and the remaining part approximately two to three weeks after transplanting, with an occasional later application. This practice has the potential advantage of reducing the injury to transplants that frequently occurs when high rates of preplant fertilizer are used, especially if it is

The extent of potassium nitrate's usage either in mixed fertilizers or for direct application will be influenced significantly by its availability to the manufacturer or grower at prices competitive with those of current sources of potassium and nitrate nitrogen.

applied in a single band beneath the plant. Side-dressing also provides a means for replenishing the supply of nitrogen and potassium which may have been removed from the root zone by leaching from the sandy soils on which flue-cured tobacco is generally grown. When the practice of side-dressing is desirable, nitrogen and/or potassium are the elements that are generally recommended. While the level of chlorine, sulphur and nitrate nitrogen in side-dressing fertilizer is probably not as critical as that in preplant mixtures, it is desirable that they be of a similar magnitude. In side-dressing experiments with flue-cured tobacco, potassium nitrate was compared with equivalent amounts of nitrogen and potassium from either ammonium nitrate and potassium sulfate or ammonium sulfate and potassium sulfate (10). The side-dressing treatments were superimposed on fumigation treatments in which the preplant fertilizer contained either ammonium or nitrate nitrogen. The results show that on fumigated soil and with ammonium as the source of nitrogen in the preplant fertilizer, the yield and quality of the tobacco from the potassium nitrate treatment was superior to that from the other side-dressing treatments. On fumigated soil in which the nitrogen in the preplant fertilizer was in the nitrate form, or on soil that was not fumigated, differences between the side-dressing treatments were smaller and less consistent. The response to potassium nitrate, however, was generally equal to and in some

cases superior to that from the other side-dressing treatments.

Greenhouse Cultures

The preceding discussion has been concerned with some of the situations in which potassium nitrate would serve as a useful material in the fertilization of field crops. In addition to this use, potassium nitrate has been shown to have a potential in the fertilization of crops grown in greenhouse cultures. The commercial production of tomatoes under glass, for example, is of considerable importance in certain areas. In the production of these plants in the greenhouse, however, abnormally high rates of fertilizers are frequently used and since the greenhouse soils are not subjected to the intensity of leaching that normally occurs under natural field conditions, the matter of excess soluble salts becomes a problem. With the standard fertilizer materials, the major portion of the problem associated with soluble salt accumulation is concerned with the accumulation of sulfate and chloride anions. To avoid this problem, it has been suggested that fertilizers free of sulfates and chlorides be used; namely monoammonium, di-ammonium and monopotassium phosphates and potassium nitrate (21). Experimental evidence has shown that with the use of these materials exceptionally large quantities of nitrogen, phosphorus and potassium can be maintained over long periods in greenhouse soils without the danger of excess soluble salts. For example, after two

years of growing tomatoes under glass with considerably greater than normal nutrient levels, and using the above sources, the salt concentration was well within the safe range for plant growth (8). During this period yields of fruit as high as 100 tons per acre were obtained.

From the considerations discussed here, it is evident that for certain crops and systems of fertilization, potassium nitrate would be useful as a supplement to or a replacement for muriate and sulfate of potash. The extent of its usage in either mixed fertilizers or for direct application, however, will be influenced significantly by its availability to the manufacturer or grower at prices competitive with those of current sources of potassium and nitrate nitrogen.★★

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1960 Pesticide Sales Up 3%

During 1960, some ups and downs were experienced in sales of different categories of pesticides, as product use was adjusted to the severity of pest infestations and the vagaries of the weather.

Industry's growth pattern seen as leveling off into a steady climb.

SALES of pesticide chemicals in 1960 averaged three per cent over 1959 figures, totaling an estimated \$285 million at the basic manufacturer's level, according to a year-end report released last month by the National Agricultural Chemicals Association, Washington, D. C. The NAC views the gains in sales of pesticides over the past four or five years as an indication that the industry's irregular growth pattern may be leveling off into a steady climb. The history of the pesticide industry has been one of rapid expansion, followed by readjustment, and then by further, solid gains.

During 1960, some ups and downs were experienced in sales of different categories of industry products, as product use was adjusted to the severity of pest infestations and the vagaries of the weather. Insecticide sales were off somewhat in 1960. On the other hand, because of the generally wet, cool season, fungicide and herbicide sales were up.

NAC places particular emphasis on the gain in herbicide sales. These were reported up seven per cent over 1959. The increase reflects a wider use of herbicides designed to control specific weeds, brush, and grasses. Even more important for the future, NAC feels, is that rising labor costs for weed

and brush control along roadsides, in recreation areas, on lawns, and in public parks, as well as in agriculture, are speeding the trend toward greater use of chemicals for this kind of work.

While the sales curve for pesticides has been, and will continue, upward, profit margins have been narrowing, the report points out. This trend, common to nearly all business today, affected pesticides more acutely than many other industries in 1960. Besides cost increases for labor, materials, and distribution, agricultural chemical firms faced sharply rising expenses for research and development. Not only is the discovery of new products becoming more expensive, but expenditures also are rising for product testing to meet the ever increasing requirements for governmental approval.

Various companies report that it now costs from \$1 million to \$1.5 million to put a new product on the market. Advertising and distribution costs are in addition to this.

From all indications in 1960, it appears that research and development costs for the industry will not go down in 1961, and may continue to rise, NAC feels. As is well known, the wider use of pesticides has been accompanied by demands from non-scientific public bodies for additional research on

industry products. During 1960 the industry broadened its effort to inform the public on how thoroughly pesticides now are tested and on the adequacy of public protection against possible misuse of the products.

To maintain profitability in the face of these narrowing profit margins, the industry has stepped up efforts to improve the effectiveness of its marketing operations. Farmers make up the largest single market for pesticides. In 1960, a survey, sponsored by one company in the industry, was made of farmers' attitudes toward pesticides.

The survey disclosed that nearly all farmers approved the use of industry products. Seventy-three per cent said that farmers who use industry products are "smart" and "successful". Yet, the survey disclosed that most farmers fail to use pesticides to the optimum amount, due to lack of application equipment and to lack of know-how about using the products.

Closing the farmers' "knowledge gap," as disclosed by the survey, offers the industry an opportunity for a broad expansion of sales in 1961 among people who already are the industry's best customers.

One moderating influence in 1961 may come with any attempt of the Federal Government to make a drastic cutback in farm surpluses, either by taking land out of production or by limiting off-farm sales. What effect any such program may have cannot be calculated in advance, and may well be partly or completely counterbalanced by the nation's growing awareness of the threat pests pose

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C-VPFA Annual Meeting

FORMULATORS URGED TO TAKE RESPONSIBILITY FOR PROPER USE OF PESTICIDES BY FARMERS

One of the most important problems associated with pesticides is residues. The industry has the competence to deal with this problem, but it will have to act by imparting sound information to farmers.

FORMULATORS must assume a responsibility in advising users to apply agricultural chemicals properly, Dr. W. L. Popham, Office of Administrator, ARS, USDA, Washington, D. C., told the annual meeting of the Carolinas-Virginia Pesticide Formulators Association, Dec. 5 to 7, at the Carolina Hotel, Pinehurst, N. C. Dr. Popham pointed out that no agricultural commodities ever have

been seized because of excessive residues when chemicals have been used according to directions.

The agricultural chemical industry, he said, has the competence to deal with the problem of residues. However, he added, it will have to act by imparting sound information to farmers.

Pointing out that one of the most important problems associated with pesticides is residues, Dr. Popham said that the question is "Are some of the chemicals that have done so much to improve our food supply likely to be harmful if ingested at high levels?" Consumers, he added, have come to expect quality standards never dreamed of 50 years ago, and chemicals are the only means of attaining most of these standards.

Because methods of analysis to determine residues of pesticides in

food crops are becoming more sensitive every day, Dr. Popham warned that an acceptable use pattern today could be un-acceptable tomorrow. There must be established, he said, a minimum above which residues cannot be tolerated. We need a more accurate definition

PICTURED ABOVE

Left to right: (top) Douglas Blocker, American Cyanamid; Charles K. Stuart, Stauffer Chemical Co.; Howard Elmer, Chemagro Corp.; Ken Blanchard, Carter Insecticide & Chemical Co., Wallace, N. C., outgoing president of C-VPFA; J. C. Whitehurst Jr., Coastal Chemical Corp., Greenville, N. C., secretary-treasurer; and John Thompson, Graham Chemical, Greensboro, N. C., 1961 president of C-VPFA.

(Bottom) Latane Lamb, Retzloff Chemical Co., Houston, Tex.; James C. Brinkley, Virginia-Carolina Chemical Co.; Robert Peacock, General Reduction Co., Chicago; A. F. Fuchs, Atlas Agricultural Chemicals, H. G. Barclay, Atlas; and W. J. Gehweiler, R. T. Vanderbilt Co.

tion of zero as applied to tolerance, he said.

In the final analysis, Dr. Popham said, the responsibility for meeting the residue problem must be met by all facets of the agriculture industry. It is agriculture's responsibility, he continued, to see that the public derives the maximum benefit from agricultural chemicals. To do this, he concluded, chemicals must be used safely.

Dr. Norman Kramer, U. S. Food and Drug Administration, Atlanta, Ga., discussed procedures used by the FDA for enforcing pesticide tolerances. He said that

FDA inspectors regularly investigate growers, suppliers, and custom applicators to obtain crop samples which are analyzed in FDA laboratories throughout the country.

Among the different sampling methods employed by FDA inspectors are selective, semi-selective, objective, quota, and survey sampling. Selective sampling, Dr. Kramer said, is used when there is reason to believe that a tolerance has been exceeded. In every case in which FDA expected that pesticide residues on a crop would be too high, he said, inspection of samples confirmed this belief. When a tolerance is found to have been exceeded, he said, the crop is seized and taken from the market. If a grower continues to misuse chemicals, Dr. Kramer said, he may be subject to prosecution. He added, however, that only 40 seizures have been made and there have been no prosecutions. This, he said, is an enviable record.

If the pesticide industry continues to operate as it has for the past few years, he said, there will be a decrease, not an increase, in seizures. Distributors, Dr. Kramer pointed out, have a responsibility

to see that the use of their product is in compliance with the law. In this regard, he advised dealers not to oversell a product and to make sure that growers know how to use a product when it has been purchased.

One useful agricultural chemical represents an investment of \$1.5 million and 10 years of testing before it is ready to market, G. L. Dennis, field sales manager of the Naugatuck Chemical Division, U.S. Rubber Co., told the group. He explained that as many as 5,000 chemicals might be developed by researchers in order to find a single chemical with commercial possibilities. Years of laboratory, greenhouse, field, and toxicological tests then are required before the chemical is ready for sales to farmers.

"This tremendous investment in time and capital is the reason why marketing programs for agricultural chemicals must be sound and why they must communicate effectively to the grower the advantages a new chemical holds out to him," he said.

Mr. Dennis then outlined the technique used by Naugatuck to

(Continued on Page 79)

PICTURED BELOW

Left to right: (top) John Molony, Molony Fertilizer Co., Charleston, S. C.; Frank S. Reid, Quality Chemical Co., Wilson, N. C.; Ed Phillips, Carolina Pyrophyllite Co., Greensboro; Gene G. Ward, Union Carbide Chemicals Co., W. A. Dixon, American Mineral Spirits Co., Charlotte, and H. F. Macrae, AMSCO.

(Bottom) Dr. Walter J. Mistric, N. C. State College, Raleigh; Thomas E. Lytle, Shell Chemical Co.; Robert L. Hendrix, Shell; Dr. Norman Kramer, FDA; Dr. W. L. Popham, USDA; and J. Myron Maxwell, Maxwell Insecticide Co., Cary, N. C.



Suppliers Respond To Mixers' Questions

Phosphate producers point out that they—like fertilizer mixers—have a non-uniform raw material supply. Only way to insure complete uniformity is to mine, grind, and mix all rock.

As reported in the December, 1960 issue of *Agricultural Chemicals* (see pages 30-32) fertilizer manufacturers directed several questions and objections to raw material suppliers, relating particularly to non-uniformity in raw materials received, at the 10th Fertilizer Industry Round Table, Nov. 3 to 5, in Washington, D. C.

T. Pierce, Swift & Company, one of the early speakers on the suppliers panel, reminded his audience that phosphate producers have the same problem the mixers are objecting to . . . a non-uniform raw material supply. "Mother Nature," he observed, "does not provide a uniform rock supply,"—only by mining all the rock available, grinding it, and mixing it all thoroughly, could the phosphate producers hope to provide a completely uniform material.

Commenting on superphosphate, E. F. Carnell, Davison Chemical Company, pointed out that chemical and physical properties of superphosphate can be adjusted to meet any specifications,—however, the user will have to pay for such a hand tailored product.

Another speaker observed that users want to pay the price for an r.o.p. product, but still would like the product to meet specifications. The two demands are obviously incongruent, he pointed out.

E. F. Carnell summarized the most common complaints made by fertilizer mixers: 1) varying analysis of P_2O_5 and APA; 2) from condition and formulation standpoint, the problem results from

varying water content; 3) varying free acid content; 4) presence of certain trace elements, which form gels and interfere with storage, for example, aluminum and iron phosphates and magnesium and sodium salts; 5) fines and other particle size problems.

W. W. Harwood, International Minerals & Chemical Co., outlined some of the processing factors in handling phosphate rock and the related problems producers must face. Factors affecting cure, he reported, include: length of time, depth of pile; location of materials in pile, temperature of the pile. Shipping is affected by: climate; intransit conditions; storage conditions; sample preparation; handling and conveying equipment. Some of these factors can be controlled, he continued,—others must be adjusted for.

Triple superphosphate is made under very close control. The weather, market and several other factors affect curing time in the pile. If the cure is extended, then available P_2O_5 is higher than planned, — and similarly P_2O_5 is

less than planned if curing time is shortened. Very close range control from car to car is desirable, admitted Mr. Harwood, but can be achieved only through close control measures, which may not be economically feasible.

There are two types of variation, remarked R. L. Jones, Armour Fertilizer Co.,—the day to day or car to car type,—and the seasonal type variation in superphosphate. The day-to-day type variation, he pointed out, is due to:

- 1) Reaction in the pile continuing all through the pile,—not necessarily uniformly.
- 2) aeration during shipment, and some water evaporation
- 3) free acid and insoluble content in the phosphate (due partly to speed up of some reactions because of aeration)
- 4) evaporation,—moisture loss—affected by temperature of superphosphate and humidity
- 5) super on edge of pile is cooler than at the center,—thus the moisture content will differ.

The seasonal variation in general amounts to 2-3%—mixers customarily allow for this variation by changing formulas.

W. L. Hill, USDA, reported the following standard deviation in commercial shipments from one supplier of standard super, stating, "If one manufacturer can provide

Seated: D. O. Walstad, American Cyanamid Co.; W. E. Jones, Northwest Cooperative Mills, Inc.; and H. B. Tatum, U. S. Phosphoric Products. Standing: W. W. Harwood, International Minerals & Chemical Co., and T. Pierce, Swift & Co.



such analysis, why can't the others." Standard Super at shipping time

avg. P ₂ O ₅	Std. deviation
20.76	.11
20.79	.16
20.87	.10
Den analysis, open den, standard super	
20.50	.10
Triple super	
47.65	.44
48.81	.31

Potash Manufacturers Panel

N. T. Wendt, American Potash & Chemical Co., described the production of crystalline, agricultural grade muriate of potash, and granular agricultural muriate, defining the properties, particle size, analysis, density, etc. of the various grades. D. Bourne, duVal Sulphur & Potash Company, reported on the basic flotation process for potash manufacture, while Dean Gidney, Potash Company of America, discussed granular potash.

All potash producers agreed that it is desirable to standardize on nomenclature, and indicated that when users agree on what they want, producers will be most happy to cooperate.

The merits of potash offered by Southwest Potash Co. were described by Van Rogers; Robert Heck spoke for International Minerals & Chemical Corp., and Edward Kapusta represented U. S. Borax and Chemical Corp.

Solid Nitrogen Carriers

A REVIEW of various solid nitrogen carriers for the fertilizer industry was presented by C. E. Waters, Nitrogen Division, Allied Chemical Corp., who reported that the principal solid nitrogen carriers are: ammonium nitrate and ammonium nitrate-limestone mixtures, ammonium sulfate, sodium nitrate and urea.

Ammonium nitrate for fertilizer use contains about 33.5% nitrogen. Pellets are usually coated with a finely divided mineral such as kieselguhr or kaolin. Because it is so very soluble in water, and even more soluble in ammonia,

ammonium nitrate is the principal solid nitrogen compound in the majority of ammoniating solutions. It has particular value in granulating mixed fertilizers—the basis for this is the very high rate of change in water solubility with temperature.

Ammonium nitrate-limestone contains 20.5% nitrogen and comprises about 60% ammonium nitrate and 40% mineral matter. The material furnishes calcium, needed in some soils, and if made with dolomite, it also furnishes magnesium. Most ammonium nitrate-limestone products are intended primarily for direct application, but may occasionally be of service to the fertilizer mixer.

The theoretical nitrogen content of **ammonium sulfate** is 21.2%. Although the relatively low nitrogen content is a disadvantage in high analysis fertilizers, ammonium sulfate is still the principal nitrogen compound added to mixed fertilizers in solid form. It is favored for its low hygroscopicity and generally good effect upon the condition of the fertilizer made with it.

Sodium nitrate (commercial grades contain about 16% nitrogen) is used for direct application, and also in certain grades of mixed

fertilizer that are required to have a particularly high proportion of their nitrogen in the nitrate form. For example, fertilizers intended for use on tobacco fields shortly after fumigation are required to have definite proportions of nitrate nitrogen.

Urea has a higher nitrogen content than any other commonly used solid, the theoretical value being 46.6%. Coated pellets are commonly used for direct application and for mixing. For making liquid mixed fertilizers, it is of course preferable to use uncoated pellets or even crystal urea.

Urea is of value in mixed fertilizers because of its high nitrogen content. It is also of special value in nongranular goods, making them less likely to cake. It is usually best to avoid making fertilizer that contains high proportions of both ammonium nitrate and urea, since the combination is likely to result in excessive hygroscopicity and stickiness.

H. H. Tucker, Sohio Chemical Co., and J. Sharp, Spencer Chemical Company completed the discussion on nitrogen materials, discussing the various nitrogen solutions offered to the fertilizer industry, solution nomenclature and the trend toward universal solutions.

Phosphate Production—Use, Storage, Handling

Moisture content, free acid content, particle size, porosity—are among specifications of superphosphate important to ammoniation.

A THOROUGH analysis of phosphates in the fertilizer industry—the present status of rock supply, future outlook, use in continuous superphosphate production, use in making mixed fertilizers, etc., was presented by representatives of fertilizer raw material suppliers and fertilizer producers. J. Engelbus, IMC, opened the discussions with an outline of production and quality control of phosphate rock.

Manufacture of superphosphate at Davison's Curtis Bay,

Md., plant was described by R. H. Wheless, Davison Chemical Co. A modern continuous manufacturing process described as the "Super-Flo" process was installed by A. J. Sackett & Sons, Baltimore, with first production by the process in April, 1959.

Davison's Super Flo process was designed to tie into the existing ground rock storage bunkers, acid supply, and fume removal system. (The entire system, and illustrations were described in the June, '59 *Agricultural Chemicals*).

The process uses rock analyzing about 74.5 to 75% BPL, received from Florida mines and ground to 75-80% minus 200 mesh. For each part of ground phosphate rock, sulfuric acid consumption is about .6 parts by weight basis 100% H₂SO₄. Moisture of the superphosphate as it is discharged to storage is about 10% and after 3 to 4 week cure, it drops to approximately 6%. Conversion is in the range of 98.5%, with a typical analysis being 20.2% APA and .25 to .3% citrate insoluble. Higher conversions can be attained, said Mr. Wheless, but at the expense of increased moisture, increased acid consumption and some impairment to product physical condition.

"Some eighteen months of experience," observed Mr. Wheless, have shown us that most of the savings and other benefits we had hoped for in our modernization have actually been achieved."

Final Responsibility

As part of a panel discussing "triple superphosphate — its behavior in mixed fertilizer formulation," J. Markey, Tennessee Corp., reported that for most satisfactory ammoniation, the raw materials should contain correct amounts of free acid and moisture, — particles should offer adequate surface for ammoniation, and adequate porosity. On the other hand, he reminded his listeners, the mixed goods manufacturer must assume the final responsibility for successful fertilizer production. He must exercise operational controls: handle raw materials correctly; maintain correct ammoniation temperature; maintain correct reaction time; and assure correct distribution of nitrogen solutions.

Mr. Markey reviewed the chemical and physical differences in the various grades of triple phosphate rock, coarse and granular,—with relation to chemical analysis, average screen analysis, and approximate ammoniation rate. He reported also on the effect of particle size in ammoniation of triple superphosphate,—and on the effi-

ciency of ammonia recovery as related to moisture content of triple super.

Charles Franklin, International Minerals & Chemical Corp., another panel speaker, continued the discussion on characteristics of triple superphosphate, confirming Mr. Markey's comment that absorption of ammonia depends greatly upon porosity and particle size, with 80-mesh particles ammoniated at about 4.3 lbs ammonia per unit P₂O₅, and 6-mesh particles ammoniated at 3.1 lbs ammonia per unit P₂O₅. He observed that moisture in ammoniating triple superphosphate should be about 3.0%,—and that even distribution of liquid materials in the ammoniator is particularly important for good ammoniation. In commenting on the effect of temperature in ammoniation, Mr. Franklin indicated ammoniation rate is below temperatures of 100° F. Above 100° F the ammoniation rate is about 4.0 lbs. ammonia per unit

P₂O₅,—but this rate falls off as temperatures increase over 200° F.

Don Walstad, American Cyanamid Co., reminded Round Table members that although fineness and porosity of triple superphosphate enhance ammoniation, these factors are not the most favorable for granulation. It is necessary, therefore, to adjust formulation practices for optimum ammoniation and granulation. He suggested adjusting the formula to increase the liquid phase and heat of reaction.

Mr. Walstad presented the following comparison of rates of ammoniation and heat of ammoniation:

Material Reacted with Ammonia	Rate of Ammonia- Ammoniation lbs NH ₃ /unit P ₂ O ₅	Heat of Ammoniation per pound NH ₃
Normal Super	5.8	1430
Triple Super	3.8	1540
Sulfuric Acid 66°	.324	2940
Phosphoric Acid	7.2	1780

Metering, Sampling, Recording Among Problems

METERING, sampling, recording, quality control, etc., were among discussions of the panel on "Communication Problems in Instrumentation," with comments and suggestions from the following participating experts: William Strauss, Foxboro Company, Foxboro, Mass.; D. L. Warren, BIF Industries, Providence, R. I.; A. Simmons, Fischer & Porter Co., Warminster, Pa.; and W. Law, Minneapolis-Honeywell, Minneapolis.

William Strauss in commenting on meters and control of material flow in a fertilizer plant, observed that more and more variables are being recorded in modern

plants. These, he said, are recorded continuously, and necessary adjustments made automatically. Efficient operation in a plant, would require several operators, yet a well planned plant, with adequate instrumentation, recorders, etc. can operate very effectively with minimum operators in a central room. Mr. Strauss pointed out that condensed control panels are increasing in use,—offering the operator all data in a smaller space than previously occupied by some control panels.

The speaker also observed that modern control methods can relieve the laboratory of routine production checks, — that instruments can be used to reduce losses of over-formulation in the fertilizer plant. "There is a need in the fertilizer plant" he observed, "for continuous in-line moisture analysis." This problem, he added, can probably

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PART III

of this report on
The Fertilizer Industry Round Table
will appear in the February
AGRICULTURAL CHEMICALS

Pesticides And Public Health

Most cases of poisoning with the organic phosphates, and probably with other pesticides as well, result from flagrant disregard of safe handling instructions and from gross carelessness in storing these materials.

It, therefore, seems logical that if any further legislative and regulatory activity is deemed necessary to protect the public health, it should be directed toward the user rather than toward the manufacturer.

THE principal problems in manufacturing pesticides today concern economics rather than health, Dr. Harold H. Golz, director of industrial health, American Cyanamid Co., New York, declared at a symposium on public health aspects of agricultural chemicals. The symposium was held Nov. 1 in San Francisco as a part of the joint meeting of the Industrial Medical Association, American Industrial Hygiene Association, and the Occupational Health Section of the American Public Health Association.

In recent years, Dr. Golz pointed out, there has been a pronounced trend in the legislative and executive branches of government toward absolutism in protection of the public from environmental health hazards created by man. While the motivation for this pursuit of perfection is commendable, he said, the question of whether the benefits are worth the higher cost as compared with the cost of a more reasonable program is a matter for debate. An important part of the cost is the discouragement of research and develop-

ment, without which technological progress must cease.

To comply with current statutes and regulations, the manufacturer of a new pesticide must invest a minimum of four years and \$1,000,000 before a single pound may be sold. An average would be closer to five years and a \$2,000,000 investment. There is every indication that this situation will worsen before it improves, Dr. Golz continued. Factors of competition, obsolescence and adverse governmental decisions on controversial issues combine to create a real possibility that the manufacturer may never realize sufficient profit to recover his investment. Certainly no small company can undertake such a gamble, and increasing numbers of large companies are becoming reluctant to speculate with their capital in an enterprise in which the odds against a reasonable profit are constantly growing larger, he said.

The imposition of heavy restrictions upon industry would be justifiable if there were unequivocal evidence that without them there would be a significant public

health problem. But there is no such evidence. Dr. Golz said that he knew of no instance in which residues of pesticides on food have affected the health of consumers in any way, even before Federal Law required the establishment of tolerances. It would seem that the public food supply already is adequately, perhaps excessively, protected, he said.

It is, of course, an established fact that many accidents have occurred in the handling and application of the more toxic pesticides. What we do not know is the magnitude of the problem. With the phosphate ester insecticides, there has been widespread mis-diagnosis of poisoning, and cases of suspected or confirmed poisoning are frequently dramatized in public communication media. Despite the high toxicity of many of the organic phosphates, Dr. Golz continued, we believe that, contrary to public opinion, their safety record is remarkably good considering the quantities used.

There is general agreement that there are no reliable data on the incidence of poisoning with

pesticides. The State of California is to be commended on the fact that it has made the only systematic effort to collect data. However, the figures are quite misleading because they are based on the physician's first report of occupational injury. "I would venture a guess that the majority of cases reported in this manner could not be confirmed," Dr. Golz stated.

Most cases of poisoning with the organic phosphates, and probably with other pesticides as well, result from flagrant disregard of safe handling instructions and from gross carelessness in storing these materials. Wayland Hayes has stated "Accidents with pesticides which do not involve a violation of the instructions and precautions on the label are extremely rare."* It, therefore, seems logical that if any further legislative and regulatory activity is deemed necessary to protect the public health, it should be directed toward the user rather than toward the manufacturer as has been the case in the past. Until man can be educated to avoid carelessness, Dr. Golz predicted, technological progress will exact its toll in accidents whether it be in the fields of pesticides, space travel or even recreation.

Also appearing on the panel was Robert Z. Rollins, chief of the Bureau of Chemistry, California Department of Agriculture, Sacramento. He said that pesticides are indispensable in modern production of food, feed and fiber crops; for the protection of wood structures, fabrics, and stored foods; and for the protection of livestock and people themselves from annoying pests. Much of the spectacular control of vector-borne diseases and increase in agricultural production in the past 20 years, Mr. Rollins stated, has been achieved by control of pests with chemicals.

In addition, Mr. Rollins said, more is known about the toxicities of the common pesticides than is known about the toxicity of mus-

tard, pepper, coffee, or of most foods or drugs. It is probable, he added, that some common foods would not pass the scrutiny to which pesticides are subjected. A constant program of inspection and sampling assures users that the materials conform to their guaranteed analysis and that the labeling complies with requirements of law, he pointed out.

Dr. John T. Wilson, Jr., Santa Clara County Health Department, San Jose, Calif., said that the problem of agricultural pesticide poisoning is closely related to the forms in which these substances are applied, the method of application, the method and time of harvesting, and the people who work at these tasks. Few cases of illness occur among formulators of pesticides because protective controls are utilized. The person who applies the pesticide in the field, whether he be owner or itinerant worker, Dr. Wilson said, is most apt to be exposed to a dangerous concentration during application.

The problem of poisoning from agricultural pesticide chemicals will largely be solved when no further cases occur on the farm, Dr. Wilson predicted. This will occur, he added, only when there is a full appreciation of the dangers inherent in the use of each substance and when protective equipment is used properly. Ideally, he said, one would restrict the use of hazardous agents to a small number of trained people. Supervision of this group is important—also supervision of those working near them. Thus, Dr. Wilson concluded, if a worker cannot be con-

trolled, he cannot, indeed should not, handle these agents.

In establishing tolerances or the amount of pesticide residue which may be found on the raw agricultural commodity, the Food and Drug Administration primarily is concerned with chronic toxicity, Dr. Mitchell R. Zavon, Kettering Laboratory, Cincinnati, said. Acute toxicity, he continued, usually does not enter into the picture. The objective, Dr. Zavon explained, is "to set tolerated residues more or less regularly over long periods of time."

As presently established these values appear to be quite conservative, he said. No illness has apparently resulted from such residues and the health of the public has, if anything, been benefitted by the resultant abundance of food. However, it should be recognized that in establishing tolerances, values are based on animal toxicity data and the minimum amount of chemical needed to do the required pest control job. No account is taken of the amount of chemical removed during processing and food preparation, nor is there any significant amount of data derived from studies on human beings as a check on the validity of our present control methods, he pointed out.

By and large there is excellent compliance with established tolerances. There can be no question, however, that there are violations and many seizures have been made of foodstuffs containing excessive residues of pesticides. Milk has been a particularly difficult problem in this regard because of the

(Continued on Page 76)

More is known about the toxicities of the common pesticides than is known about the toxicity of mustard, pepper, coffee, or of most foods or drugs. It is probable that some common foods would not pass the scrutiny to which pesticides are subjected.

*Hayes, W. V., Jr., "Agricultural Chemicals and Public Health," Public Health Reports 69:898, October 1954.

Current and Future Pesticides are Topics at Annual Entomological Society Meeting

Board of Scientists Advocated to Assist FDA

WHAT guidance can scientific inquiry give on public health issues like the one which flared during the 1959 pre-Thanksgiving season, when the government ordered the destruction of cranberries alleged to be unsafe because of the improper use of chemical weed killers?

This widely publicized incident caused the appointment of a Panel on Food Additives to advise President Eisenhower, through his Science Advisory Committee, on the scientific and administrative problems involved in the increasing use of food additives.

Dr. J. George Harrar, Vice-President of The Rockefeller Foundation and a member of the Panel, discussed its recommendations in a Plenary Address at the annual meeting of the Entomological Society of America, held at the Haddon Hall Hotel, Atlantic City, N. J., November 28-December 1.

Dr. Harrar reported that the Food Additives Panel had reviewed three major problems concerning carcinogenic (cancer-producing) food additives: (1) recognition; (2) the relationship of animal dosages to cancer production in man; and (3) administration difficulties in recognition and relationship.

Dr. Harrar pointed out that the law had allowed a very narrow margin of administrative discretion to the Secretary of Health, Education, and Welfare, Arthur S. Flemming, when he ordered the destruction of the cranberries. To help

avoid future fiascos of this type, Dr. Harrar told ESA, the Panel has recommended that an advisory board of scientists be created to assist the Secretary in evaluating the scientific evidence concerning the health effects of food additives.

Dr. Harrar explained that the definition of a carcinogen requires discretion in its interpretation, because so many variables enter into a judgment as to whether a particular substance is or is not carcinogenic.

Since the margin of administrative discretion based on the rule of reason is unavoidable if the amendment is to be workable, this discretion must rely, the Panel maintained, on the most informed and expert scientific advice available.

It was the Panel's conclusion, Dr. Harrar stated, that the rapidly

increasing number of new chemicals of value for agriculture and food production demand vigilant and careful scrutiny to safeguard the consumer from those that may present carcinogenic and other toxic hazards.

He discussed the following Panel recommendations to serve this end:

(1) A board of scientists be appointed to advise the Secretary of Health, Education, and Welfare and to assist in the evaluation of the scientific evidence on the basis of which decisions have to be made prohibiting or permitting the use of certain possibly carcinogenic compounds.

(2) The board be composed of scientists from the National Cancer Institute, the Food and Drug Administration, the U. S. Department of Agriculture, and of scientists outside government nominated by the National Academy of Sciences.

(3) Major functions of the board: (a) to weigh evidence as to whether or not the tests for carcinogenicity are appropriate and reasonable and whether the substance under test is or is not carcinogenic as determined histopathologically or by other scientific criteria; and (b) to advise as to whether the addition of the substance to agricultural products would result in a concentration exceeding its natural background level.

(4) Legislation should be modified if it does not permit the Secretary of Health, Education, and Welfare to exercise reasonable discretion.

(5) All government agencies concerned with carcinogenic food additives should step up the study of representative carcinogens in a variety of animal species in an attempt to define dose-response relations.

(6) Studies of substances to which large numbers of individuals have already been exposed should be undertaken to relate them to the incidence of cancer in the exposed individuals.

(7) Additional safe and effective materials for the production and processing of foods should be actively sought by industry, by the Department of Agriculture, and by the state agriculture stations.

More than 800 entomologists from industry, extension services and government attended the national meeting, to discuss pest control problems, general entomology, apiculture, physiology and toxicology, genetics, etc. An estimated 200 research reports and invitational papers were presented at concurrent sessions. Reviewed on these pages are some of the reports presented at this meeting.

New Approach To Insect Control Seen Necessary

DEVELOPMENT by insects of resistance to insecticides and certain potential hazards associated with the use of insecticides emphasize the necessity of exploring new approaches to insect control, observed S. F. Knipling, chief of USDA's entomology research division. These new methods of control will materialize only "if we broaden and intensify basic investigations in the field of entomology," he added.

Further research into the fundamentals of insect physiology, behavior, nutrition, and factors that affect insect population trends may suggest new approaches such as the use of natural or synthetic sex attractants, growth regulating chemicals, chemical sterilants, biological control agents, or materials that interfere with insect metabolism, he said.

Dr. Knipling remarked that there is every reason to be optimistic about the future of insect control. The very concept of dealing with entomological problems on a national and international basis is evidence of the world recognition of the importance of insects to human welfare, he remarked.

Chemical industries with their well trained scientists and development resources are in a position to develop substitute insecticides and other chemicals to meet emergencies such as those that have arisen in the past decade. Furthermore, he said, educational institutions have and are developing scientists who are qualified to undertake intricate and complex research into the fundamentals of insect life—"the master key to further progress in dealing with insect problems."

Prescription Pesticides

ANOTHER government official, Dr. Albert Perry of the Public Health Service remarked:

"It is not far-fetched to predict that in the not-too-distant future one might be able to prescribe an insecticide for a particular need,

much as the pharmacologist prescribes a drug." This precision in insect-pest control is merely one of the goals of present research efforts to understand more fully insect physiology and toxicology, he added. Dr. Perry discussed the contributions of insect physiology and toxicology to human welfare.

Based on the principle that

some organisms have the ability to detoxify and eliminate a compound, insect physiologists and toxicologists are now synthesizing compounds such as acethion, acetoxon, prothion and propoxon with predicted toxicities favoring warm blooded animals. They also are engaged in research in other methods of insect control—due to stricter regulations against toxic residues on foodstuffs—utilizing enzymes, hormones and antimetabolites.

Boll Weevil Hit in Weak Spot by Entomologists

A PROGRAM designed to use existing chemical and cultural methods against an extremely critical period in seasonal existence of the cotton boll weevil has shown promise in tests conducted since 1958 by the Texas Agricultural Experiment Station.

Three entomologists from the Texas Station, J. R. Brazzel, T. B. Davich and L. D. Harris, reported that the controls were applied in the fall when the diapausing boll weevil population is developing.

Methyl parathion, the entomologists said, was highly effective for the control of diapausing weevils in a caged small-plot experiment conducted in 1958. The adult population was killed by periodic applications of the insecticide before any attained firm diapause.

A large-scale field experiment conducted during 1959-60 in the Presidio area of far West Texas also produced encouraging results. Four applications of methyl parathion at .5 pound per acre were applied on a 12 to 14-day schedule beginning just before harvest and continuing until frost. Approximately 525 acres were treated—400 acres were about 15 miles from the nearest untreated field and 2,300 acres of untreated cotton were used for the comparison.

Boll weevil damage was not found in the 400 acre treated field until August 25 and no extensive damage resulted from weevils during the season. Weevils were found on May 10, 1960, on seedling

cotton in the untreated area. Sixty per cent of the untreated fields were infested by June 30.

The entomologists said the results from this experiment indicate that the late-season applications of insecticides reduced the numbers of over-wintering boll weevils and possibly eliminated them in parts of the area. They believe the results merit further research for several reasons: namely, financial savings due to need for fewer insecticide applications; more effective use of predator and parasite populations for the control of injurious pests; fewer generations of boll weevils would be subjected to the selective action of insecticides and the possibility of their developing resistance lessened; and such a program would allow the cotton to set most of the crop without the potential threat from weevil damage if rains or other factors disrupted control schedules.

If a high percentage of the overwintering weevils could be eliminated in the fall, natural mortality during the winter and supplemental control measures during the next year could bring this \$300 million pest much closer to eradication, the entomologists said.

PART II

of this report of the annual meeting of the Entomological Society of America will appear in the February issue of **AGRICULTURAL CHEMICALS**.

VELSICOL

INSECTICIDE OUTLOOK for 1961:

plans, promotions, and favorable trends indicate expanded sales opportunities for formulators!



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Extensive tests conducted by leading experiment stations prove that Heptachlor can't be beat for effectiveness in control of soil insects. Demand for Heptachlor continues to grow. In 1961, you will see more intensive advertising to capture even more sales. Besides major regional and state media, Heptachlor will be promoted in hundreds of local newspapers and billboards.



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Endrin is relatively new, in terms of uses and acceptance. 1960 saw the development of many new Endrin markets. Apples, potatoes, cotton and many other crops were widely treated with Endrin during the past year. The use of Endrin-Methyl Parathion mixtures for cotton insect control proved especially popular and effective. In 1961, you can anticipate a big Endrin demand in all markets, helped along by strong promotional programs keyed to local requirements.

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Proper Application Methods Stressed For Effective Control of Fruit Tree Pests

Growers Should Know at what time in the insect's life it is easiest to kill, and what material will do the best job. When an orchardist does develop a good spray program, he should stay with it until a better spray program is developed.

Costs, thinning, and new products also are discussed at 56th annual meeting.

by Loren H. Milliman

NO matter how good an insecticide is, it will fail to control the pests if it is applied at the wrong time or in the wrong way, Edward W. Anthon, entomologist at the Tree Fruit Experiment station, Wenatchee, Wash., told orchardists during the 56th annual meeting of the Washington State Horticultural association in Yakima. More than 1,200 were registered for the event which started Dec. 5 and ended Dec. 7.

Having good neighbors who also combat insect pests correctly is important in obtaining control, Mr. Anthon added in his talk on "Causes of Stone Fruit Pest Control Failures." Growers should know at what time in the insect's life it is easiest to kill, and what material will do the best job.

"When an orchardist has a good spray program which has produced good quality fruit, he should stay with it until a better spray program is presented," the speaker declared in warning against trying some "one-shot" material.

Tedion is an acaricide which should be applied when the mites first appear, because it acts slowly but has ovicidal action and is most effective on immature mites. Parathion and Malathion have good fumigating qualities so must be used when the temperature is high to obtain the full value of their effectiveness.

Before the peach twig borer became difficult to control, a spray could be applied either in the pre-pink or in the shuck stage, and even if the timing were poor, the spray was effective. Now, better timing and a thorough spray application are needed. Where the infestation is severe, both pre-pink and petal fall sprays are required.

If other peach growers in the vicinity fail to control borers in their orchards, difficulties will result, the speaker commented, because the residual action of these early sprays is not effective long enough to control borers which attack peaches in May and early June.

Many catfacing insects which cause losses of up to 12% of the harvested fruit could have been killed by spraying the cover crop at the right time. Ditch banks and borders of the orchard should be sprayed at the same time as the trees.

Failure to change the spray discs or adjust the direction of the spray nozzles when moving from peaches to a cherry planting, for example, is another cause for lack of control of pests.

Mr. Anthon advised the growers to obtain daily information on

weather prospects in their own locality when they planned to spray, because oil will damage trees in cold weather, and some other materials are harmful when temperatures are high.

Losses to bee keepers were recognized by the orchardists who adopted a resolution seeking additional research to eliminate bee poisoning in the orchard areas. Thousands of stands (hives) have been lost in the Yakima area alone during each of several seasons, and some bee men are threatening to give up the business if a solution is not found.

Sevin As Thinner

Sevin looks very promising as a thinner on Jonathan, Newton and some other varieties where other thinning chemicals have been erratic, according to Dr. L. P. Batjer, USDA principal physiologist stationed in Wenatchee. In 115 different treatments over three seasons consistent thinning was obtained. Dr. Batjer conducted some of his tests in Australia to speed up his investigations with the insecticide which was first used commercially in 1958 to combat DDT-resistant codling moths.

It was observed in the Manson, Wash., area that some thinning of fruit resulted when Sevin was applied shortly after full bloom. As a result of tests conducted to date, it appears that best thinning results are obtained from applications made between 15 and 25 days following full bloom. Dr. Batjer commented that three seasons are insufficient to provide conclusive evidence.

He added that he was not suggesting that orchardists use the insecticide to replace the thinning materials they have been using in the past, but they could make some trials of Sevin under their own orchard conditions. Where trees are planted close and pruning has been light, there is a possibility of over-thinning, he warned.

Studies have not been made on the minimum amount of Sevin which will provide satisfactory thinning, but $1\frac{1}{2}$ pounds per 100 gallons of water produced as much thinning as did twice that amount. In one trial $\frac{3}{4}$ pound per 100 gallons thinned as much as did $1\frac{1}{2}$ pounds, he added.

Seed abortion apparently occurs only in the Delicious variety when Sevin is used as a thinning spray, with 47% of the seedless fruit persisting at harvest. However, the size of the seedless fruit was as good as that of the apples with seeds, and the shape was perfect, according to Dr. Batjer.

Costs of Spraying

Costs of spraying apple and pear orchards were reported on by Wallace Van Amburg, horticulturist for the Perham Fruit Corporation, Yakima. He advised orchardists to keep in mind the possible carry-over of pests when they are planning their spray program. In 1954, a satisfactory spray program cost \$57 an acre for apples and \$65 an acre for pears. Since then there has been a shift to more expensive materials.

However, materials which cost more per pound actually may be the most economical to use if a smaller number of spray applications are adequate, he pointed out. In the Perham Fruit Corporation orchards, apples receive one dormant spray, a cover for first brood codling moths, and a late-summer spray for aphids and mites, with possibly a second cover for second brood codling moths. If the moths have been a problem, two sprays are applied about two weeks apart, for the first brood.

The dormant spray is oil or an

oil-lime sulfur combination, with zinc oxide added if there is zinc deficiency. If all three materials are used, the cost comes to \$14.48 per acre for materials. Depending on conditions, the dormant spray is alternated annually with a pink stage miticide (Genite, Fenson or Mitox) for red and brown mites, and BHC for aphids. Control of rosy aphids has become more of a problem since the switch from DDT unless the pest is checked with a delayed dormant or a pink stage spray, Van Amburg declared.

Using $3\frac{1}{2}$ pounds of Fenson and nine pounds of BHC W 12 and twelve pounds of zinc oxide per acre, the material cost is \$11.34, he reported. Mildew control on susceptible varieties calls for $4\frac{1}{2}$ pounds of Karathane and 12 ounces of X 77 spreader, bringing the cost per acre for these materials to \$7.50.

Mr. Van Amburg likes Guthion and Sevin for codling moth control, because of their long residual action, but they seem to have eliminated the beneficial insects for the season. Mite and aphid predators seem to have built up some resistance to DDT and parathion, so these materials have certain advantages, according to the speaker.

For mites, he uses Kelthane and Tedion. Based on an application of 800 gallons per acre, he reported the following costs:

Material	Rate per Acre	Cost per Acre
Guthion	12 lbs	\$21.36
Sevin	12 lbs	14.16
Parathion	8 lbs	7.28
DDT	24 lbs	7.92
Kelthane	15 lbs	13.50
Tedion	8 lbs	13.84
Malathion	16 lbs	12.16
Diazinon	16 lbs	20.00

Kelthane or Tedion with Malathion make a good combination for mites and aphids. Diazinon is effective longer than Malathion and is an excellent aphicide. Tedion, because of its slow action, should not be used where a heavy mite infestation has developed, he pointed out.

Figuring in depreciation, repairs, gas, oil, and labor, the cost

of applying from 600 to 800 gallons per acre by airblast machine is about \$6 an acre.

Pear blight can be controlled by three applications of 20% copper-lime dust at the rate of 30 pounds per acre.

Concentrate Sprays

Concentrate type spray applications are hazardous for large operators, Francis Crane of Brewster, Wash., declared, but for the small grower who is perceptive, precise and meticulous, concentrate spraying can be equal to or better than what is achieved with the heavier airblast machines.

Mr. Crane reported that his total costs per acre, using a concentrate machine, were \$65 for three cover sprays. Mr. Van Amburg listed his total costs at from \$85 to \$113.50 per acre, depending on the program used. (His spray schedule included a dormant application that cost \$20.48 per acre.)

Farm Poisonings

Since organic phosphorous compounds have been introduced into Finland these materials have provided one of the most common means of suicide there, reported Dr. James E. Zimmerman of the Highland Medical Clinic, Cowiche, Wash.

"On the average, one of you will leave a chemical around which will kill some child this year," he told the orchardists. "It always makes a doctor feel bad to see a little child made ill or die because of some adult's carelessness." Farm poisonings and accidents are much more serious than industry's, he declared.

Although all chemical companies list atropine as an antidote for organic phosphorus spray poisoning, Dr. Zimmerman classed as "stupid" the practice of growers treating themselves with the material which is itself a poison.

A wonderful new drug has been developed by the Army and has become available to civilians for the first time this year, although it is in strictly limited supply.

(Continued on Page 82)



PRODUCTION ROUND TABLE



by Robert E. Robinson
Atlanta Utility Works
East Point, Georgia

Equipment Maintenance (Part 2) Analyzing Failures

GENERAL OBSERVATIONS APPLICABLE TO MOST EQUIPMENT

(Continued from December Issue)

5. Indications to the Sense of Taste

a) Acidity or alkalinity

May sometimes help spot an abnormal process condition or identify a leakage condition

b) Rancidity

May indicate condition of oils or greases

ANALYZING PERFORMANCE FAILURES OF PARTICULAR ITEMS OF EQUIPMENT

1. Belt Conveyors

Indication	Check
Belt not tracking properly	Straightness of belt splice Warpage of belt Improper loading (on one side) Frozen idler rolls Conveyor frame not square and true Pulleys out of square Idlers cocked Material build-up on pulleys or idler rolls
Belt slipping	Adjust take-ups for proper belt tension Frozen idler rolls Material build-up
Belt sagging	Idlers spaced too far apart Belt carcass too light Belt carcass failing Adjust take-ups for proper belt tension
Belt wearing on edge	Indicates belt not tracking properly (see above)
Belt wearing on cover	Frozen idler rolls Material build-up, especially on return belt idlers Loading chute skirts or flashing rubbing on belt Poor loading conditions especially with abrasive materials
Indication	
Premature failure of belt	Excessive belt tension (under engineered) Severe conditions (heat, moisture, chemicals, abrasion); requires special belt materials, features
Belt does not trough properly	Belt too stiff for width and load; New belts will loosen up with use
2. Rotary Drum Equipment (Batch Mixers, Ammoniators, Dryers, Coolers)	
Changes in performance as failure to discharge properly, changes in analysis, fuming, dusting, leakage	Material build-up, missing flights or other parts, condition of liquids distributors or spargers
Binding or rubbing of steel to steel	Adjustment of seal parts, loose parts
Drum thrusting to one end	Levelness of base (unless an inclined unit) Cant of trunnion wheels (see manufacturer's instructions) Adjustment of drive gear and pinion Adjustment of thrust rollers
Excessive wear of gear and pinion teeth	Adjustment of mesh of teeth Alignment of gear and pinion axes (parallel for proper tooth contact) Soft metal in gear, pinion
3. Screening Equipment (Revolving Screens, Vibrating Screens)	
Lumps in fines hopper	Holes in screen wire cloth; replace Tailings chute plugged and tailings bouncing or spilling over; clean chute, re-

<i>Indication</i>	<i>Check</i>	<i>Indication</i>	<i>Check</i>
Lumps in Fines Hopper <i>(Continued)</i>	pair tailings mill, install baffles or seals to prevent material from getting back into fines hopper Feed to screen bouncing over or leaking past screen body near intake; install baffles or seals	Inadequate Performance <i>(Continued)</i>	Improper speed Proper feed Excessive permanent "run-around" in closed circuit; tailings chute should be blocked off and all material removed regularly. This will remove metal, very hard lumps of material and other foreign material, leaving the tailings mill free to work on the oversize tailings from the screen build-up
Reduced screening capacity	Inadequate tailings mill resulting in too much "run-around" Non-uniform distribution of material on screen surface; screen not level, correct feed chute Material build-up, screens blinded; clean wire cloth Clean out closed screening-tailings circuit regularly to remove permanent "run-around" Adjust vibration (see manufacturer's instructions) (see below) Check bumper on revolving screens Use slotted opening wire for greater % open area unless paper scraps and wood slivers are a problem Add a primary crusher or breaker to reduce large lumps ahead of screen to reduce "run-around" by permitting more material to pass the screen the first time, thus reducing the load on the tailings mill, elevator and screen and increasing the effective capacity of the screen and entire mill.		Inadequate power; many jobs are more severe now than formerly, especially with wetter mixes, more build-up Condition of drive; slippage Loss of hammer heads, cage rungs; chain replace
Change in Vibration	Condition of springs or shock-mounting cushions Material-build up (may dampen vibration) Drive (slippage, correct speed) Change in weight due to change in wire cloth (may change balance and affect vibration) Adjust vibration (see manufacturer's instructions)	5. Bucket Elevators Loss of capacity	Buckets missing Material build-up in buckets Material not discharging properly; check discharge throw-plate, speed; reduce speed for light, dusty or fluffy materials if not discharging properly Provide as uniform a feed as possible to the elevator
4. Tailings Mills <i>(Pulverizers, Cage Mills, Chain Mills, Impact Mills)</i>		Elevator choking down	Improper loading; provide as uniform a feed as possible to the elevator; use feeder, or regulating valve in elevator intake chute; use loading leg, curved boot plate where applicable Drive; adequate power, drive slippage
Inadequate performance	Wear of working parts; replace, or repair by building up with hard surface weld rod; reverse and re-install reversible hammers etc. Condition of breaker plates, gratings; clean, free-up, re-adjust	Irregular running	Chain and buckets out of balance; missing buckets, buckets not uniformly spaced; some buckets heavier than others not spaced evenly, material build-up in buckets Buckets slapping against casing, or opposite strand of chain
		Chain climbing sprocket teeth	Chain too loose; adjust take-ups or increase weight on gravity take-ups Casing too small, especially for tall elevators Use anti-sway plates Elevator not true (vertically plumb) Chain or sprocket badly worn or out-of-pitch Shafts not horizontal and parallel Sprocket warped Elevator not true (vertically plumb)

<i>Indication</i>	<i>Check</i>
Excessive dusting and blow-back	Chain speed too fast Improper discharge with material falling back down elevator shaft Casing too small in section, relative to bucket size Feed uniformly
Chain freezing	Select chain with graphite lubricated barrels in block links; special materials if necessary, especially for corrosion and high temperatures
Corrosion	Provide venting to remove fumes, moisture, lower temperatures Select special materials if necessary
RECOGNIZING SPECIAL OR UNUSUAL CIRCUMSTANCES	
Isolation of any single change that makes a difference from normal conditions	Temperature, Weather Conditions Electrical voltage coming in to plant or equipment Air pressure Operating procedures, timing, etc. Formulas, materials, moisture content of materials

<i>Indication</i>	<i>Check</i>
	Alterations to equipment, repairs Unfamiliar operating personnel

THE PROCESS OF ELIMINATION

Follow check lists to systematically and progressively eliminate possible causes of trouble, until the cause has been isolated and can be corrected

COMMON SENSE

IT will be noted that all of the above suggestions are offered not as the last word or as an exhaustive treatment, but simply as a beginning point for good troubleshooting. Wild guesses should always be avoided. Simple, logical consideration of all the facts available, with alertness and inquisitiveness for the truth, will most often lead to the solution of most troubles. It will be noted that very little has been said about the subject of drives, which would include motor couplings, reducers, pillow blockbearings, shafting, "V" belt, flat belt, and roller chain drives, and control components. Manufacturers' literature is available in profusion and it is suggested that use be made of this very helpful material.★★

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Picture this: You're a fertilizer ingredient buyer. Your busy season's ahead. You begin the routine . . . check the list of suppliers, schedule calls, hope for fewest conflicts. The parade begins. One salesman after another — all with products that claim basic specs . . . then your own lab evaluations, shipping dates, inventory control, handling and rehandling. And all the time you hope no one on the *long list* drops the ball. It's worry season for you.

Change the scene: IMC's salesman has the answer — a full line of fertilizer products. And all quality-controlled from mine to you. Want Super? It's on

track — coarse, granular, run-of-pile. Potash? Which form — muriate, sulphate . . . sulphate with magnesium? Phosphate rock the way you want it . . . the grade and grind you need. And add phosphoric fertilizer solutions too.

Above all, the consistent, dependable service and quality of IMC products result in superior fertilizer ingredients that add to the effectiveness of your finished formulas . . . their selling appeal on the farm.

Next time it's your "worry season," give the go signal to your IMC salesman. He'll help keep you on track.



Washington Report



by Donald Lerch

PRESIDENT-elect Kennedy wants a middle-of-the-road administration. His Cabinet appointees support this view. But, the Kennedy team's tilt will be toward more government intervention in business, agriculture, and in every aspect of our economy.

Such is the current size-up of an Administration everyone in Washington agrees will be more political than we have had since FDR. In other words, it will be more responsive to expressions of mass political opinion, and this may be hard on agriculture.

Farmers are fast losing the mass political power they have held since the country was founded. They are divided on many major issues. But, politically-wise farm leaders here point out consumers, labor, and wildlife conservation groups do have mass political power.

Furthermore, the new Administration will be loaded with city people. The real challenge to agriculture in 1961 is to inform non-farm people about the farming facts of life. A lead in this effort already is being taken by the Na-

tional Agricultural Chemicals Association. Much of NAC's 1961 transcribed radio series will feature information directed to consumers.

The Manufacturing Chemists Association, has an extensive consumer-education program underway, aimed primarily at school children, home economists, food technicians and the like.

All in all, you will experience more action, more changes, and a greater need to stay on top of Washington developments once the Kennedy administration moves into action.

ON TRACK WITH THE ANSWERS TO ONE-SOURCE PRODUCT SUPPLY

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- Standard Muriate of Potash
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- Granular Muriate of Potash
- SUL-PO-MAG®
- Phosphate Rock, 75/74% BPL Run-of-Mine Unground
- Phosphate Rock, 68/66% BPL Run-of-Mine Unground
- Phosphate Rock, Run-of-Mine Ground
- Triple Superphosphate, Run-of-Pile
- Triple Superphosphate, Coarse
- Triple Superphosphate, Granular
- Phosphatic Fertilizer Solution

This does not mean that all, or even very many, of the new Administration's actions will be unfavorable to the fertilizer and pesticide industries. You can expect an attempt to solve the surplus problem. Also in the cards is a trend toward putting more farm commodities under marketing quotas, such as we now have in cotton and tobacco. But the best thinking here is that this move will not come so fast that it will upset any apple carts.

The new Secretary of Health, Education and Welfare, Gov. Abraham Ribicoff, for example, is known to have taken a sincere interest in agriculture in Connecticut. He also had a special department concerned with consumers' interests.

While his future actions as HEW secretary are not yet known, he could do both agriculture and consumers a great service by straightening out the record on the safety of U. S. food supplies, which has been muddled somewhat over the past few years. Such action would also benefit those growers whose produce is exported. Partly because of past agitation over residues inside the U. S., such countries as West Germany are putting up strong objections to importing citrus fruits which have been colored or which bear chemicals to retard fungus damage.

We repeat — the direction the new administration will go on many issues will depend upon the number of people who express themselves forcefully and effectively. Those who keep their views to themselves are likely to be ignored when the big decisions are made.

A number of very fine and very true things were said about chemicals on foods at a symposium on "Science and Food" sponsored by the Food Protection Committee of the National Academy of Sciences here in Washington. The event was poorly reported, but the speeches do offer fine background material for further building public confidence in our American food supply.

Here are just two significant quotes from that meeting:

Charles G. Mortimer, Chairman, General Foods Corporation, "Public awareness of why and how chemicals and additives are used in growing, processing and storing foods will do much . . . to help check the creeping notion that additives are 'badditives' . . . The greatest protection the public enjoys is the inherent sense of responsibility the food industry is demonstrating for the health of our people. We need to get across to the public the obvious fact that food processors have a big stake in keeping consumers healthy; that the millions of good, lively, healthy consumers we serve today are the customers we want to continue to serve for as many tomorrows as possible."

David H. Dawson, a research chemist and a Vice President of E. I. du Pont de Nemours and Company: "Any consideration of risk without simultaneous evaluation of the potential benefit is . . . in grave danger of effectively preventing progress, or at least ensuring that it be achieved distressingly slowly. The problems in increasing food supplies faster than population growth are of such magnitude that we need to accelerate and not to hinder their solution."

During 1961 you will see an expansion of the "public's" attack on cleaning up the rivers and streams. One conclusion of the National Conference on Water Pollution here was to expand the program to inform the public on the problems involved in water pollution.

This will hit hard at the pesticide industry. A letter on the Public Health Service letterhead to outdoor writers sent prior to the conference placed great stress on fish kill (allegedly caused by pesticides leached into streams) and ran through the old story of how many more pesticides we have today than we did 15 years ago.

What people who believe the attacks on pesticides should take more seriously are incidents such

as that involving Dr. J. J. Van Gasse who recently authored a "Police Gazette" attack against alleged "poisons" in our food supply. According to the *Coos Bay, Oregon, World*, November 3, Dr. Van Gasse was convicted in a jury trial Nov. 2 on a charge of obtaining money by false pretenses while serving as the Coos County Health commissioner.

Two areas being mentioned by Industry leaders here as ones in which both the fertilizer and pesticide industries can make a big impact upon the public's mind are the Food and Agriculture Organization's world-wide Freedom from Hunger campaign, and our own Agricultural conservation program.

Dr. Edward F. Knipling, Director of Entomological Research for USDA's Agricultural Research Service, just back from a business visit to Nigeria, Africa, reports that possibly the single biggest obstacle to African development of a thriving cattle industry is sleeping sickness transmitted from wild animals to domestic animals and humans by the tsetse fly.

As Director of Entomological Research, Dr. Knipling was attending an international conference in Nigeria to study progress on the control of this disease and the fly which transmits it. Drugs have been developed both to prevent the disease and to cure it. But, says Dr. Knipling, these are too expensive for year-round use on cattle. In one area, Africans tried killing off the wild animals which are hosts to the disease and ran into violent opposition from wildlife enthusiasts all over the world.

The best bet for unlocking the tremendous potential of Africa for raising livestock, he says, is the wider use of insecticides sprayed on tree trunks where tsetse flies rest. Providing an ample, dependable food supply, in turn, would solve the greatest single cause of unrest in Africa and smooth the way for orderly advance of the continent into the civilized world.

(Continued on Page 76)

Arcadian® News

Volume 6

For Manufacturers of Mixed Fertilizers

Number 1

ANNUAL SURVEY REVEALS OPTIMISTIC OUTLOOK FOR 1961 FERTILIZER SALES

Nitrogen Division's annual survey to determine the market potential for fertilizer reveals many promising signs. Comments by leading industry representatives across the country indicate there is widespread optimism about further growth in sales of mixed goods during 1961.

The outlook has even improved a little over forecasts made last spring for continued fertilizer sales increases, according to Nitrogen Division.

Major part of the growth will probably be in the North Central region, particularly the West North Central, the survey shows. Some progress is expected in the Middle Atlantic, Southern and Western regions. The forecasters think New England will hold steady. No region is expected to decline.

However, realization of a good fertilizer year depends, as always, on weather conditions being normal or better.

The trend toward high-analysis fertilizers will continue, industry leaders believe. High-nitrogen grades are popular, and indications are their sales will grow throughout 1961.

Corn acreage is expected to be re-

duced slightly—probably by less than two million acres. Some corn land in the Midwest will be diverted to soybeans, but this will represent only a small part of the increase in soybean acreage. The trend to less corn in the Southeast may continue. But in spite of these conditions, the Nitrogen Division survey shows more corn land may be fertilized at higher rates than ever before, weather permitting.

Cotton acreage, it is indicated, will be up during the coming season. There is some anticipation of a rise in the support price. Bulk of the million-acre increase in 1961 cotton allotments has been given to the area east of Texas. However, these farmers traditionally underplant and abandon much more acreage than growers do in the West.

Small grain acreage may be up a little. Wheat will be about the same, but oats will probably increase due to higher prices relative to other feed grains.

Look for some substantial growth in sugar beet acreage, because of the Cuban sugar situation. There will not be an acreage explosion; the U. S. lacks sugar beet processing facilities.

Acreages of other major crops are expected to be about the same as they were last year.

Larger harvests that offset lower prices are why farm income went up slightly in 1960. The income and general cost situation is favorable toward more fertilizer sales. Biggest rise in farm costs in 1960 was interest on mortgage indebtedness, which was up 10%. Taxes were up 8%. Fertilizer costs increased 1%. This should encourage farmers to try to produce more yields on existing land.

Southeastern Comments

Comments from the Southeast point to many reasons for a promising fertilizer year ahead. In the opinion of one industry leader, optimism can be based on the fact that most farmers agree they had a good year in 1960.

Another Southeastern representative reports: "Dealers are collecting old fertilizer accounts three and four years on the books, due to the rise in farm income." He estimates an increase of 8 to 10% in the sale of mixed fertilizers this spring.

(continued on following page)

Arcadian NEWS for Fertilizer Manufacturers from NITROGEN DIVISION

(continued from preceding page)

Others are more modest in their predictions, but are generally encouraging. "Prices for tobacco, corn and small grains all look good," a North Carolina fertilizer man declares, "and this is a factor pointing toward a possible overall rise of 5% in the sale of mixed fertilizers during the first six months of 1961.

A sampling of opinion in Virginia indicates mixed fertilizer sales will be up 4%. State farm income is expected to increase 5%. Prices of farm commodities are good. Industry people say fertilizer raw material is readily available, and they expect the manufacturing and distribution picture to be favorable. Colleges are recommending higher-analysis fertilizer which will have a long range effect in building up the industry. The 12,600 additional acres of cotton allotted to Virginia should represent additional fertilizer sales.

A Greenville, North Carolina, representative states that the bright outlook for fertilizer sales is based largely on what tobacco did in 1960. An excellent crop sold at high prices. Although corn was damaged some by storms, cash income from this crop also was above average. Peanuts, beans and other crops were fair.

An industry spokesman from Raleigh says: "Sales for the first half of the year should be at least the same tonnage for North Carolina as in 1960—about a million tons. Fall fertilizer sales were good. Excellent weather conditions permitted top-dressing of pastures, and there was plenty of small grain and grass seeding. I look for tobacco and cotton acreage to stay the same. There may be a switch from corn to soybeans on some farms and this could result in less fertilizer use. There probably will be more granular and semi-granular fertilizer grades manufactured this year."

One other North Carolina representative estimates a 5% sales increase. He thinks tobacco and corn yields last year will contribute to the farmer's welfare, but says the situation could have been better if Hurricane Donna had not damaged some crops.

Soil Fertility Program Helps

A South Carolinian reports: "Fall fertilizer usage was up, and we believe spring will see the same. The Clemson

soil fertility program of soil tests and recommendations is expanding. Farmers in general have a better outlook than last year, and this will lead to increased sales for us, particularly on grain, cotton and corn."

A second spokesman from South Carolina predicts that farmers will be able to finance a good farm program this year. "They will be in the mood to increase yields through the use of more plant food," he points out.

Another report from that area forecasts an increase in spring sales of approximately 2 to 5%. The Clemson soil fertility program is again mentioned as a contributing factor.

Large numbers of new mechanical cotton pickers were purchased in South Carolina during 1960. This may contribute toward a willingness to plant a greater portion of the cotton allotment this year. The fertilizer man who makes this observation also believes the sale of mixed goods could increase as much as 10%. He cites the good yield and price of tobacco as an added supporting factor.

Still another South Carolina fertilizer man predicts total sales of 500,000 tons of mixed goods—nearly the same as the first six months of last year.

Reports from Georgia about prospects for fertilizer sales are on the encouraging side. One representative predicts a 5% increase, and says he would go higher except that some sections suffered from drought.

Some Georgia fertilizer people think tonnage will be the same this spring. Manufacturers expect no hardship from raw material availability, but they predict little manufacturing expansion.

Here is an interesting statement made during the Georgia survey: "Farmers who are surviving today must be good managers. They have learned the value of fertilizer and now represent a better market."

A comment from Florida mentions Hurricane Donna caused an erratic movement of mixed goods last fall. Nearly everyone around the state expects a better spring fertilizer season.

Up in the Mid-South, a Kentucky-Tennessee manufacturer thinks there will be a 5 to 7% sales increase. "Farmers are getting better educated on the value of higher fertilization on cash crops," he asserts. "Less mixed fertilizer

may be used on pastures due to poor cattle prices, but there will be an increase in the movement of mixed goods due to new cotton acres being planted."

Eastern Predictions

Fertilizer demand should be about the same as last year in New England. The dairy farmer is a good customer. Higher nitrogen grades are gaining better acceptance.

Western Pennsylvania is looking for a smooth shipping season, which it has not enjoyed for several years. Manufacturers expect a rise in tonnages, and will use better production methods. Farm prices are good, and more plant food is being suggested through soil testing.

"Results of the past season are showing what can be done through proper fertilization," an industry representative explains, "and the general economy of the area seems to be in fine shape for the coming year."

One disturbing factor in Pennsylvania is the rapid decline of small grain acreage throughout the state. Poor prices and yields have contributed to this situation.

Delaware and Maryland Eastern Shore manufacturers look for an increase in fertilizer sales, provided weather is better than it was last spring. College recommendations have been revised with emphasis on increased use of higher-analysis fertilizers. A well-received soil fertility program was recently launched in three Southern Shore counties.

"Pasture fertilization is beginning to get a foothold in this area," according to one spokesman, "and should contribute to increased consumption."

Midwest Looks Promising

Demand for fertilizers have been flourishing in the Midwest for the past several years. There is reason to expect this market will continue to expand.

"More farmers realize the necessity of using fertilizer," declares a leading manufacturer. "They see it will make the greatest return in the shortest period of time, compared to other products they purchase for use on the farm. More bankers are realizing this, too, and they are willing to lend money for fertilizer applications."

Reports from Kansas, Nebraska, North Dakota and Minnesota seem to rank

Arcadian News for Fertilizer Manufacturers from NITROGEN DIVISION

among the most optimistic in the Midwest. Indiana and Ohio predict a more modest sales rise in the offing, with the possibility of greater increases, depending upon preplant weather.

Reasons for the overall favorable outlook in the Midwest are: (1) Higher farm income than last year, (2) better fertilizer distribution through larger numbers of small mixing plants and warehouses, (3) and greater use of bulk spreaders assigned to dealers.

Less wheat acreage last fall because of late corn harvest may mean more corn this year, a manufacturer points out. He predicts a 3 to 5% sales increase for mixed goods in Ohio and Indiana. Farmer education and acceptance of fertilizer is at an all-time high.

Additional commentary from Indianapolis substantiates this estimate, and cites the same percentage figures. Another Indiana opinion sets the figure at 4%. Factors that will favorably influence fertilizer sales, says the representative making this report, are livestock prices, continued good results with fertilizer, favorable costs for mixed goods and more local distributors who are giving better service.

An Ohio representative says the trend is just starting to plow-down more fertilizer there. "In the past, we have been selling about 80% starter fertilizer. The switch to plow-down should cause mixed goods to go up about 5 to 10% this year," he asserts.

Warehousing Improved

"Dry manufacturers are putting in more warehouses at a rapid rate," he continues. "This should aid distributors during the rush season. All manufacturers are pushing soil testing which will promote higher and heavier rates of fertilization."

A Michigan fertilizer man explains that sales should be slightly higher because: (1) Farmers harvested the largest bean crop on record, (2) beet production is down, but sugar content is up and growers enjoyed income that was as high as a year ago. He states that the economy of the area is tied closely to these two crops.

From Minnesota comes the report that this will be a better spring for fertilizer than last year, which was cold and wet. Better weather conditions should enable

more corn planting at earlier dates, causing farmers to use broadcast and starter fertilizers. Pasture will probably get an extra helping of plant food this year, partly due to an increase in farm income, the report says.

Both Minnesota and North Dakota had good fall harvest weather, and this created interest among farmers about fertilizer. Their mood was favorable, and they could see results of their fertilizer applications.

North Dakota agricultural college recommendations for use of nitrogen and mixed grades have been upped. The new bulk spreaders for applying blended goods are catching on fast in this area.

Iowa and Illinois expect sales equal to last year. They may increase slightly, most manufacturers think, because crop response was favorable to fertilizer last year. Southwest Iowa reports a rise in fall movement of mixed goods. Sub-soil moisture is above average.

Nebraska claims an excellent outlook for 1961, due to good crops and fertilizer results in 1960. One industry representative says: "Fertilizer promotion has helped here. Higher analysis will be the rule, and we expect more potash will be applied."

Last fall, Kansas and Nebraska farmers harvested one of the most bountiful corn and sorghum crops in their entire history. Their good results with fertilizers will give a boost to sales this year. The industry also may see more use of fertilizer-insecticide combinations in corn rootworm areas.

Missouri fertilizer people think sales will be steady in comparison to last year.

Southern Market Analyzed

A Mississippi representative believes there will be a 5 to 10% increase in the sale of mixed fertilizers this spring. "The big reason," he explains, "is more competitive selling to farmers. This makes manufacturers work harder and actually creates more sales."

He goes on to point out that the South is getting more bulk distribution and larger applications of fertilizers are being recommended by the state colleges. "Plenty of mixed goods are available at reasonable prices, and the general outlook is good," he concludes.

Alabama farm income was high last year. Fertilizer sales this spring are

expected to equal or surpass previous years.

A fertilizer man who travels Oklahoma and Texas thinks manufacturers can expect more business because of increased cotton acreage allotments. There will also be more sugar cane and sugar beet production. He says bulk spreading of fertilizer is having favorable effects in this area.

Other sample opinions from Texas and New Mexico indicate fertilizer sales might rise as much as 10 to 15%. "Soil sampling is up," according to one spokesman, "due to a good soil fertility program." He cites the bumper wheat, cotton, and grain sorghum crops last year as favorable factors. "Better college recommendations also are playing a vital role," he declares.

Western Forecasts

Manufacturers in the Rocky Mountain area anticipate a 15% increase in the sale of mixed fertilizers. The trend toward higher-analysis fertilizer is definite.

A Western representative gives the reasons behind this trend:

"For one thing," he says, "there is a lower unit cost for high-analysis mixtures. Also, small blending plants are serving the farmers in local areas with the exact plant food nutrients required. All fertilizer can be applied in one application with these mixtures."

"There are a couple of other factors that will be important next year," he went on. "There will be a 10% increase in the sugar beet acreage allotment. Higher prices and yields on all crops will encourage farmers to use more fertilizer in 1961."

A Good Spring Ahead

The fertilizer industry as a whole seems healthy and happy as it contemplates the spring season. Voices of pessimism are occasionally heard, but they are rather scattered. The cross-country survey paints a pretty clear picture of optimism for mixed fertilizer sales.

Now is the time for manufacturers to prepare for the big spring rush. Make sure you are ready to handle large volume orders when the demand for fertilizer hits! Build up your inventory, check your plant equipment and get ready to make the most of your sales opportunities.



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	CHEMICAL COMPOSITION %					Neutralizing Ammonia Per Unit of Total N (lbs.)	PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water		Approx. Sp. Grav. at 60° F	Approx. Vap. Press. at 104° F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	-7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
DURANA®									
DURANA is a trade-mark of Allied Chemical Corporation.	37.0	13.3	53.4	15.9	9.4	7.2	1.235	0	36
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

*DURANA contains 8% formaldehyde.

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Fertilizer Views and News



by Vincent Sauchelli

Dr. Sauchelli is a Consultant to the Agricultural Chemicals Industry.

Is It True What They Say About Sodium?

DR. D. Katakouzinos of the Central Geophysical Laboratory in Athens recently published a research paper which disputes the alleged injurious effects of nitrate of soda on the structure of alkaline soils used for crops under the dry climate of tropical and subtropical regions. A similar study has been issued by The Royal Agricultural Society in Egypt as Bulletin No. 40, by R. Aladjem, Chief of the Chemical Section, Cairo, Egypt. This Egyptian study covered a period of 36 years, and was designed to reveal the effect of continuous application of nitrate of soda to a typical soil of that country. The author's conclusion was this: "The continuous use of nitrate of soda on the same plots for 36 successive years has brought about a slight increase in the exchangeable sodium of the soils and subsoils of these plots, under the severe and abnormal conditions of the experiment. The increase remains, however, below the critical limit and has not impaired the physical characteristics of the soil nor its productivity. Whenever a soil is well-drained and contains, as in Egyptian soils, a sufficient proportion of calcium carbonate, no significant increase in the exchangeable sodium is likely to occur, the more so as farmyard manure is used at regular intervals." In these Egyptian experiments a total of 6300 kilos per feddan (0.42 hectare) was applied during the period of 36 years (1 feddan = 1.04 acres; 1 kilo = 2.2 lb.).

Dr. Hugh Nicol, internationally known chemist of the West of

Scotland Agricultural College (Glasgow), commenting on the results reported by Dr. Katakouzinos observes as follows:

"That injury to soil structure results from abnormally huge quantities of sodium, gives no warrant for concluding that sodium is inevitably bad for soils. A normal dressing of nitrate of soda supplies too little sodium to have an appreciable effect on any soil. For example, 200 kg of nitrate of soda on a hectare (176 lb. per acre) would increase the soil sodium by only 10 mg. per kg of topsoil, that is, by one part in 100,000 parts by weight. In milliequivalents (m.e.) this increase, according to Katakouzinos, is about 0.04 m.e. per liter of soil extract, an amount too small to have a detectable effect on soils already possessing 10 to 20 m.e. or more of total cations per liter of extract."

Another factor emphasized by Katakouzinos in determining whether sodium salts are injurious to a soil is the ratio of sodium (Na) to calcium (Ca). The ratio depends largely on whether insoluble calcium salts, such as calcium carbonate and gypsum (that is, calcium sulfate) are naturally present in the soil or are added. For example, gypsum is added when normal superphosphate is applied. The ratio will be low in any soil unless it naturally has both a large amount of soluble salts and a high proportion of sodium among its cations, in which case it would be considered saline and unfit for cropping.

The amount of calcium that an agricultural soil contains is usually sufficient to take care of the sodium normally supplied by an average dressing of nitrate of soda. For example, if the soil contains only 2 per cent of calcium carbonate, it therefore has an equivalent of 20 tons per acre furrow slice (50 tons per hectare). An ordinary dressing of nitrate of soda adds about 300 lb. of sodium to the acre, that is, to 2,000,000 pounds of soil (1 acre plow depth) in which root area there may be as much as 100 tons of calcium. At these rates of application, Dr. Nicol claims that the calcium will offset the action of the sodium on soil structure, and if the soil is well drained no injurious effects will be experienced.

Longenecker and Lyerly, writing in *Soil Science* (vol. 87, pp 75-79, 1959) described the effects of irrigation with waters of moderate and high salinity on 4 Texas soils. All four soils contained calcium carbonate and gypsum. Irrigation waters often introduce much more sodium than the amount contained in a generous dressing of nitrate of sodium—an acre foot of water bringing as high as 300 kg of sodium per hectare (270 lb. per acre). If the irrigations are applied at the rate of two or three acre-feet per year—the amount of sodium thus applied may be from 6 to 10 times the weight of sodium in the applied nitrate of soda.

Dr. Nicol maintains that not even such large amounts of sodium have injured the soil if reasonably good drainage exists and if the soil

(Continued on Page 78)

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Improved Application Practices Discussed by ASAE

Control of cotton insects can be as effective with low rates and simple nozzles as with higher rates and complicated nozzle arrangements, provided the same amount of ingredient is used.

EFFECTIVE control of cotton boll weevils and bollworms can be maintained with low rates of total spray material applied with simple nozzle arrangements, Lambert Wilkes, agricultural engineer at Texas A & M College, told the winter meeting of the American Society of Agricultural Engineers, Dec. 4 to 7, in Memphis, Tenn. Mr. Wilkes said that control of these insects can be as effective with low rates and simple nozzles as with higher rates and complicated nozzle arrangements, provided the same amount of ingredient is used.

He added that boomless nozzles have not proved to be satisfactory for application of insecticides in cotton. Primary reason has been the large spray droplets obtained with these nozzles, he explained.

Preliminary results of tests with an airfoil type nozzle indicate

that this might be an effective method for applying cotton insect control chemicals, Mr. Wilkes said. Experiments with an air delivery type sprayer indicate that rates of 30 gallons per acre are required to give comparable control of these insects when compared with conventional nozzles, he concluded.

Dr. LeRoy Day, associate professor, University of Missouri, and Maurice Gebhardt, U. S. Department of Agriculture, reported on experiments which indicate that soybean plants can effectively be shielded from damage due to post-emergence spray treatments. They said that even though shielded spray treatments have not always proved superior to mechanical cultivation, they have been found appropriate during wet seasons when tillage must be delayed. The shields used in the tests consisted of flat plates spaced so that the soybeans in the rows could pass between them. A 50-degree angle fan type nozzle was found satisfactory for uniform distribution of the material, they said.

Generally, they added, weed growth was less in plots where shields were used. Soybean plants were larger, they explained, so they offered more competition to the weeds.

Norman B. Akesson and Wesley E. Yates, associate professors of

agricultural engineering, University of California, Davis, reported that much can be done to control drift of chemicals during application. They reported that some chemicals have drifted as far as 22 miles during application. The two professors listed four main points to consider in controlling insecticide drift and residue.

1. Several materials function best as dusts and poor control may result when a spray formulation is used. The reverse of this also may be true in some instances.

2. Whenever chemicals are likely to drift, spray equipment should be of a type that gives a medium to coarse droplet spectrum from either ground or aircraft equipment.

3. Microclimatology of the area in which chemicals are being applied should be well known. "There usually are three or four patterns which the weather will follow on any given day," they explained. "These can be predicted from past data using information obtainable from small recording weather stations."

4. If there is any question about contamination of a crop, samples should be taken to a laboratory for analysis. Often a prediction can be made when the crop can safely be harvested.

(Continued on Page 77)

MAAA To Meet Jan. 19 to 21

The Mississippi Aerial Applicators Association will hold its fifth annual conference at the Buena Vista Hotel in Biloxi, Miss., Jan. 19 to 21, 1961.

Among the speakers listed on the tentative program are Dr. W. L. Giles, superintendent, Delta Branch Experiment Station, speaking on research in aerial application; B. F. Smith, executive vice president, Delta Council, speaking on the need for aerial application in cotton production in Mississippi; and Dr. Marvin E. Merkl, Delta Branch Experiment Station, who will discuss research as it affects the aerial applicator.

Also on the program are A. G. Bennett, Mississippi State College Extension Service, "How Applicators Can Help the County Agent"; M. H. Carter, Farmers Supply Co-op, Greenwood, Miss., "The Economics of Cotton Production and the Place of the Aerial Applicator"; and Robert E. Mon-

roe, executive director, NATA. In addition, panel discussions are planned to cover FAA regulations and the future of agricultural aircraft.

Aluminum Pump Offered

A pump for nitrogen solutions, made entirely of aluminum with stainless fittings, in 1½ inch to 2 inch sizes, now is being manufactured by the Marine Products Co., 515 Lycaste Ave., Detroit, Mich.

8th Texas Conference

The eighth annual Agricultural Chemicals Conference will be held on the campus of Texas Technical College, February 14 to 16, 1961.

The theme of this year's program is "Servicing Agricultural Chemicals — Whose Responsibility?" The conference is sponsored by Texas Tech., Texas A&M, and the West Texas Chamber of Commerce.

Two New Leader Distributors

Highway Equipment Co., Cedar Rapids, Iowa, has named as distributors Montgomery Body & Trailer Mfg. Co., Salem, Ill., and Moline Body Co., Moline, Ill. The two distributors will handle New Leader spreaders in their respective areas.

Schelm Fertilizer Applicator

A new pull-type fertilizer applicator for non-pressure nitrogen or complete liquid mix fertilizers is being built by Schelm Brothers, Inc., East Peoria, Illinois.

The applicator has no pump or air compressor to maintain and rate of flow is said to be accurately maintained regardless of material level in tank. Application rates range from 5 pounds to over 7500 pounds total weight of material per acre—or any amount in between, at travel speeds up to 15 mph.

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Small Field Plots

Safe Application Of Granular Organic Phosphate Insecticides



A double-funnel applicator can easily be calibrated to deliver a uniform rate of flow of granular organic phosphate insecticides to small plots with safety and precision.

Figure 1. Granular insecticide being distributed by the double-funnel applicator.



Figure 2. Double-funnel and applicator containing granular insecticide.

by R. E. Wester^a and Floyd F. Smith^b

SOME experimental workers hesitate to test some of the recently developed potent granular organic phosphate insecticides because of the possible health hazards in handling. These insecticides, however, can be applied safely with precision to soil and plants by use of a double-funnel applicator^c (Figure 1).

The double-funnel applicator can easily be calibrated to deliver a uniform rate of flow of insecticides for small plots. It can deliver the insecticide in a 4- to 24-inch band according to the height it is carried above the ground, or by removing the funnels in a narrow band.

The parts of the double-funnel applicator illustrated are (1) transparent tube of plastic or glass 33 inches long and 1 inch in diameter with markings for calibration, which holds approximately $\frac{1}{2}$ pound of insecticide; (2) a rubber

stopper having a $\frac{1}{2}$ -inch hole into which is fitted the $\frac{1}{2}$ -inch stem of the outer aluminum funnel (3- $\frac{3}{4}$ inches in diameter); and (3) an inner 2- $\frac{1}{2}$ -inch aluminum funnel fastened to the inside of the larger funnel by four bolts. These are shown in Figures 2, 3, and 4. The plastic tube can be filled with insecticide from the top with the aid of a funnel. The rounded tip of a wooden rod extending the length of the inside of the tube can be used as a shut-off valve at the

mouth of the insecticide delivery tube. Granular material flowing over the small funnel is spread or scattered according to rate of flow and height of the device above the soil. The outer funnel serves as a wind shield. The double-funnel applicator can be calibrated to deliver a small band of insecticide to the furrow or surface of the soil. The width of the band of insecticide depends on the diameter of spreader and height it is held

(Continued on Page 75)

Figure 3. The small funnel on the right with bolt fastened in the tube acts as the insecticide spreader which is centered and locked inside of the larger funnel on the left by four bolts located around the rim.

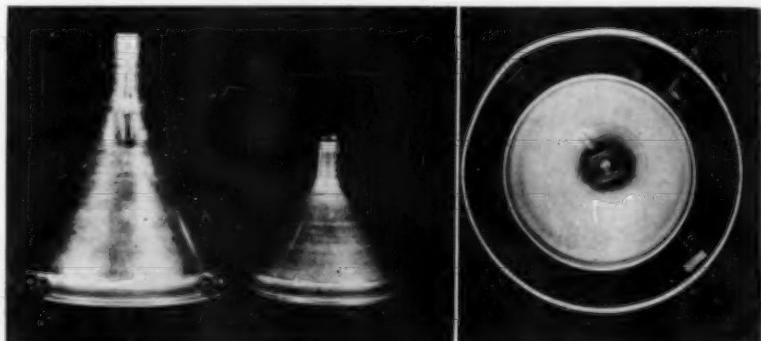


Figure 4. The small inside funnel-spreader is locked on the inside of the larger funnel. The outside funnel acts as a shield to prevent the wind from blowing the granular insecticide in too many directions.

^a Horticulturist, Crop Research Division, and ^b Entomologist, Entomology Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.

^c The writers wish to acknowledge that Tejal Gill of Seabrook Farming Corporation, Seabrook, New Jersey, first developed a similar applicator for applying granular herbicides to small plots and gave us permission to publish this method.

Thirteenth Illinois Custom Spray Operators' Training School

THE Illinois Custom Spray Operators' Training School will be held January 24 to 26 in the Illini Union Building, University of Illinois, Urbana. Meetings of the Agricultural Spraying Association and the Illinois Aerial Applicators' Association will be held in conjunction with the Custom Spray School.

The role of custom applicators, dealers, and salesmen in pesticide public relations programs will be among the topics to be discussed at the training school. Also on the program are talks by W. G. Lovely, "Performance of Granular Herbicides" and "Equipment for Granular Herbicides"; H. B. Petty, "Insect Situation"; O. H. Fletchall, "Johnson Grass Control on Highways"; and W. O. Scott, "Weed Control in Soybeans".

Other topics include: farm fly control, effect of rainfall and soil

texture on pre-emergence results, soil insecticide research, Simazine and Atrazine residues in soil; and weed control in corn.

Belt Fertilizer Spreader

The Belt Corp., Orient, Ohio, is offering a folder that describes its Series 500 "Brod-Kastor" fertilizer spreader. Among features of the spreader are a hopper that holds more than 1,800 pounds of 60 lb./cu. ft. material and fans that spread pelleted and granular fertilizer in swath widths of approximately 50 feet.

The folder is available from the company.

Hi-Shear Booklet

Hi-Shear Corp., Torrence, Calif., has prepared a booklet describing its history and plans for the future as well as a short story of the company as it appears today.

In addition to custom hardware, the company manufactures the Ag-2 agricultural airplane and the Swathmaster spreader.

Simonsen Heavy-Duty Series

A new C-70 series of bulk feed bodies designed for mill to dealer service, as well as farm delivery, is being offered by the Simonsen Manufacturing Co., Quimby, Iowa.

New Ezee-Flow Applicator

The Ezee-Flow Division of AVCO Distributing Corp., Chicago, is offering a new granular type of applicator for herbicides and insecticides. The applicator features two feed assemblies in each of the two hopper sections to individually meter herbicide and insecticide granules of all sizes.

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PEST ROUNDUP



by Kelvin Dorward

Boll Weevil Hibernation Counts Up In Three States

THROUGH November, reports had been received from three states relative to the fall boll weevil hibernation survey. Each of these shows a higher average number of boll weevils in hibernation than in the fall of 1959. Two-square-yard samples of ground trash adjacent to cotton fields were collected and counts made of live weevils in the trash to determine the average number, per acre of trash, entering hibernation. In the spring of 1961 another survey will be made in the same areas to determine the number of boll weevils that survive the winter.

Collections were made in three northeastern Louisiana parishes, (Madison, East Carroll and Tensas) where a total of 90 samples were taken at 30 locations. The average number of boll weevils per acre found was 6,860 in Madison Parish, 13,235 in East Carroll Parish, and 14,365 in Tensas Parish. The average for the tri-parish area was 11,487, as compared with 8,097 live boll weevils found in hibernation during the 1959 fall hibernation survey.

Hibernation records have been made in Madison Parish for the past 25 years. During this period there has been only one fall in which there were more boll weevils found. In 1955, 13,443 weevils per acre were found in Madison Parish, compared with the 6,860 this fall.

Three hundred and fifty-four ground trash samples were collected in four Mississippi areas. The average number of live weevils per acre of trash was 12,944 in the

lower delta, 20,087 in the central delta, 17,651 in the north delta and 7,651 in the hill section. The 1960 state average was 14,502 live weevils per acre compared with 5,127 found in the fall of 1959.

In McNairy County, Tennessee, twelve samples of ground trash were collected. An average of 2,622 live weevils per acre of trash was found. This compares with 1,882 found in the fall of 1959.

General Insect Activity

Greenbugs were collected October 27, for the first time this year, in a field of oats in the Durant area, Bryan County, Oklahoma. By the latter part of November, infestations were found in Jackson, Johnston, Marshall, Noble, and Pawnee Counties, with populations increasing in known infested areas. During the period October 26 to November 7, a greenbug survey was conducted in 25 Texas Panhandle counties. The insect was found in 22 of the counties. Some fields, in Potter, Oldham, and Deaf Smith Counties, averaged 30 greenbugs per foot of row. In other areas of the panhandle, populations ranged 1-10 per foot of row and were less numerous in the eastern part of the area.

During the early part of November, heavy populations of the spotted alfalfa aphid were present in some alfalfa fields on the Yuma mesa, Yuma County, Arizona. However, by the latter part of the month, populations were on the decrease. In Ada County, Idaho,

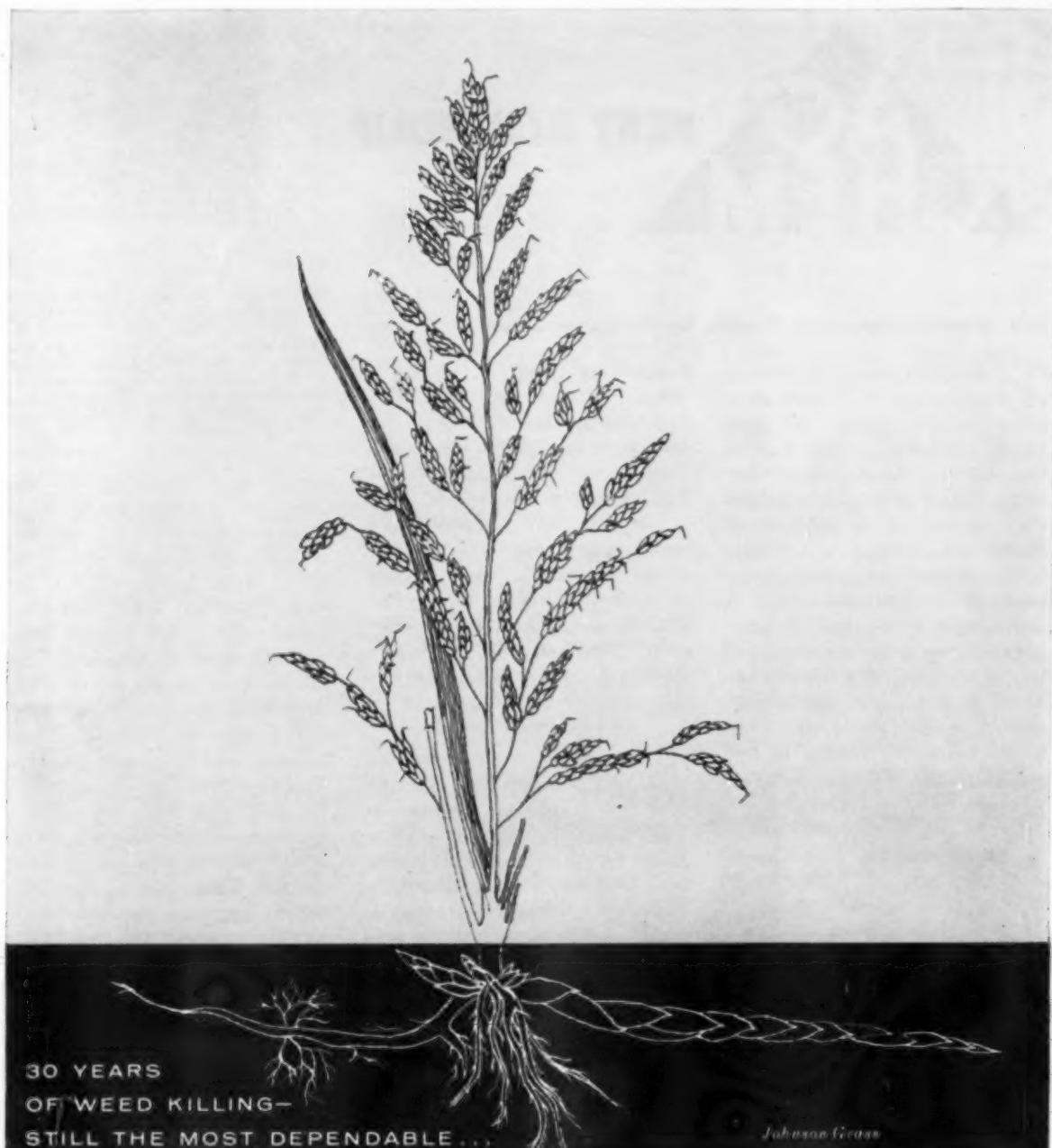
This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Survey & Detection Operations, Plant Pest Control Division, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in U.S.D.A.'s pest surveys throughout the U. S.

the aphid was found for the first time. The pest also was found in Jackson County, Idaho; the first record in the southern part of the State. High populations of the spotted alfalfa aphid were reported from Greely County, Nebraska. Counts approximated 225 per sweep of an insect net. Light populations were reported from California, New Mexico, and Oklahoma, with increases noted in the latter state.

The oriental fruit moth caused heavy late twig damage on young peach trees in Upshur County, Texas, but by early November overwintering had begun. In Oregon, the 1960 survey for the insect was concluded October 10. All fruit-growing areas of the state were trapped and 119 moths collected between May 9 and the conclusion date. The collections were only in the Salem area, with 12 properties being found infested.

Among truck crop insects, aphids were the most active during November. Early in the month, aphids were heavy locally on turnips and collards in areas of Oklahoma. Carrots and turnips were heavily infested due to a late buildup in Dona Ana County, New Mexico, gardens. These insects were on the increase on various truck crops in Sussex and Kent Counties, Delaware. Severe infestations of the beet armyworm occurred on sugar beets in the El

(Continued on Page 78)



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LISTENING POST

New Developments In Chemical Control Of Nematodes

D. DAVIS and J. E. Deak (1), of Merck Sharpe & Dohme Research Laboratories, utilized the predilection of the nematode *Panagrellus redivivus* for collecting on colonies of the fungus *Fusarium oxysporum* f. *lycopersici* as a basis for a method of assaying chemicals for capacity to attract or repel nematodes. The method depended on the number of nematodes collecting on *Fusarium* colonies placed over chemically treated filter paper discs in agar in a Petri dish. Fewer nematodes than expected on the *Fusarium* colony would indicate that the chemical was acting as a repellent; conversely, an increase in nematode numbers would indicate that the chemical possessed attractant properties.

None of the large number of chemicals (not named) tested acted consistently either to repel or to attract *Panagrellus redivivus*. However, Davis and Deak suggested that a successful search for chemicals capable of repelling nematodes should prove rewarding, especially since repellents would probably be less phytotoxic than nematicides. The assay method is rapid, inexpensive, and easy to use.

Stimulation of Walnut

Most effective control of the walnut aphid (*Chromaphis juglandicola*) in Persian walnut orchards in California is obtained with foliar sprays of octamethyl pyrophosphoramide (schradan), according to B. F. Lownsbery (2). In field tests, schradan produced such a marked increase in growth

of sprayed trees as to suggest an effect of the chemical in addition to aphid control. Since the trees that reacted so strikingly were infected with the root-lesion nematode *Pratylenchus vulnus*, Lownsbery conducted greenhouse tests to determine whether the growth response could be due to control of the nematode. He reported that schradan sprays applied to California black walnut seedlings at rates both above and below the usual orchard rate of application did not reduce the number of root-lesion nematodes in the roots. His results again showed a stimulatory effect of schradan on the growth of the seedlings, but nematode control evidently was not a factor.

Effects of Soil Fumigants

Earl B. Minton, Eldon J. Cairns, and Albert L. Smith (3) report results of a series of tests conducted from 1957 to 1959 jointly by the Crops Research Division of the Agricultural Research Service, United States Department of Agriculture, and the Auburn University Agricultural Experiment Station, Auburn, Alabama, to determine the effectiveness of soil fumigants in eradication of nematodes. They used large open-bottom concrete block bins with walls extending below and above the soil surface for the tests. They found that intermittent injections of liquid fumigants at 6-, 12-, and 18-inch depths, followed by applications of methyl bromide, would free the bins of stylet nematodes for as long as 12 months. The fumigants used were 83% 1,2-di-



by Paul Miller

This department, which reviews current plant disease problems, is a regular feature of **AGRICULTURAL CHEMICALS**. The comments are based on observations of collaborators of the Epidemiology Investigations, Crops Protection Research Branch, USDA, Beltsville, Md.

bromoethane (Dowfume W-45); 98% bromoethane, 2% trichloronitromethane (methyl bromide—MC-2); 1,3-dichloropropene (Telone); 75.2% 1,3-dichloropropene, 18.7% 1,2-dibromoethane (Dorlone); 50% 1,3-dichloropropene, 50% 1,2-dichloropropane (D-D); and 97% 1,2-dibromo-3-chloropropane (DBCP = Nemagon).

Use of the Onion Test

A. Rinkov, S. D. Van Gundy, R. L. Rackham, and M. J. Garber (4), of the University of California Citrus Experiment Station, employed the sensitivity of onion seedlings to 1,2-dibromo-3-chloropropane (DBCP) as basis for quantitatively determining the distribution of the chemical in treated soil. They adopted the "rolled towel" technique of planting onion seeds in measured quantities of the soil to be tested. The soil was spread on a paper towel, which was rolled up and placed in a covered jar. Seven days later the seedlings were measured. The percentage of reduction in growth of seedlings in treated soil provided a highly sensitive test for small quantities of the chemical.

Distribution of emulsifiable DBCP in six different citrus soils was measured by the onion test and by control of the citrus nematode, *Tylenchulus semipenetrans*. Soil samples for the onion test were taken 7 days after treatment

(Continued on Page 77)

NEWS ABOUT THE AG CHEM TRADE



Sulfur Prices Lifted

Pan American Sulphur Co., Houston, Texas, has increased its prices for Mexican crude sulfur by \$2 a long ton. New prices are \$22.50 for dark sulfur and \$23.50 for bright sulfur.

This move by Pan American is regarded as an indication that the world sulfur market is changing from a highly competitive situation to a slightly greater degree of firmness. Consumption of crude sulfur has been increasing at such a rapid rate, particularly abroad, that La Societe Nationale des Petrols d'Aquitaine in France has advanced its prices by a minimum of \$1 to as much as \$2.50 per long ton.

American producers have failed to announce any change in price, but they stand to benefit from the improved position of the world market. An encouraging factor in the firming in world prices is the easing of competitive pressure on the part of sulfur producers to sell additional tonnage, it is felt.

Richardson Names John LeMay

John LeMay has been appointed manager of industry development for Richardson Scale Company, Clifton, N. J. Mr. LeMay, in this newly-created position, will act as coordinator of sales activities.

Niagara Shifts Two

Niagara Chemical Division of Food Machinery and Chemical Corp., Middleport, N. Y., has appointed J. R. Jones as production coordinator for its 20 plants in the United States, Canada, and Mexico. At the same time, H. G. Beierl was named to succeed him

as manager of the division's plant at Middleport.

Mr. Jones joined Niagara in 1945. He had been plant manager at Middleport for the past four years. Mr. Beierl joined Niagara in 1950.

Stephens Heads Texas Gulf

Claude O. Stephens, president of Texas Gulf Sulphur Co., New York, has been named chief executive officer. In the new position he succeeds Fred M. Nelson, who retired as chairman last month.

Mr. Stephens has been president since March 1957. He has spent his entire career with Texas Gulf, having joined the company in 1932. After service as a field engineer and later as manager of the company's Wyoming operations, he became manager of its gas department in 1951. He was elected a vice-president the following year and became a director in 1956.

Mr. Nelson has been with Texas Gulf for 34 years and has served as chief executive officer since 1951, when he became president. He was named chairman in 1957 and continued as chief executive.

Hayes-Sammons Elects Three

Cornelius Vanderulis has been elected senior vice president of the Hayes-Sammons Chemical Co., Mission, Texas. Also elected were Andrew N. White, Jr., vice president, sales, and Edward H. Metz, secretary and treasurer.

Mr. Vanderulis, who had been secretary and treasurer, will continue as a director of the company. He joined Hayes-Sammons in 1950. Mr. White had been general sales manager and Mr. Metz had been controller.

Ortho Sales Meetings

The Ortho Division of California Chemical Co., held sales meetings for its Northern and Southern regions last month. The Southern region meeting was held in Miami and the Northern region met in Washington, D. C.

Salesmen, branch managers, and district managers attended the meetings to discuss new products, sales approaches and changes in policy.

Joins Gandy Sales Force

Michael G. Chavez has joined the Gandy Co., Owatonna, Minn., as a salesman in Gandy's eastern states division. Mr. Chavez is headquartered at New Cumberland, Pa.

MACA Elects Woodbury

The newly-organized Midwest Agricultural Chemicals Association has elected Herbert Woodbury, Woodbury Chemical Co., as its president for 1961.

The new group was established early last month at a meeting in Kansas City, Mo. Its members are located in the states of Iowa, Nebraska, Missouri, and Kansas. Among the principal speakers at the initial meeting was H. F. Tomasek, president of Chemagro Corp.

Other officers elected by MACA are: Douglas Nelson, Niagara Chemical Division of Food Machinery and Chemical Corp., vice president; Harold Howard, Thompson-Hayward Chemical Co., secretary; and Robert Brown, Miller Chemical Co.; Douglas Nelson, Niagara; and Ray Northrop, Associated Chemical Co., directors. The group's next meeting will be held March 3 in Omaha, Nebr.

PCA Sales Office To Move



J. R. Mell



F. H. Kennedy



R. B. Lenhart



F. E. Smith

The Potash Company of America will move its general sales office from Washington, D. C., to New York on February 1, 1961. The office has been in Washington for the past ten years. The new office will be located at 630 Fifth Avenue, the International Building in Rockefeller Center.

On the same date, the following organizational changes will be made in the company's sales department: J. Robert Mell and Frank H. Kennedy will become assistant general sales managers. Mr. Mell will handle sales in the southern half of the United States and Mr. Kennedy will be responsible for sales in the northern half of the country. Also, Robert B. Lenhart will become midwestern sales manager and will operate out of the Peoria, Ill., office. F. Edward Smith Jr. will replace Mr. Lenhart as northeastern sales representative.

*

J. C. Crissey Retires

John C. Crissey retired last month as head of the soil building division of the Cooperative G.L.F. Exchange. A G.L.F. employee for 35 years, Mr. Crissey had been division manager since 1942.

*

Head ACS Divisions

Leonard S. Stoloff, assistant technical director of Marine Colloids Inc., Rockland, Maine, has been named chairman of the Di-

vision of Agricultural and Food Chemistry of the American Chemical Society.

Other division officers are Dr. John C. Sylvester, Abbott Labs, chairman-elect; Dr. Richard W. Thoma, The Squibb Institute for Medical Research, secretary-treasurer; Dr. D. M. Doty, American Meat Institute Foundation and Dr. L. W. Hazleton, Hazleton Labs, councilors.

Named chairman of the Division of Fertilizer and Soil Chemistry was John O. Hardesty, a principal chemist with the U. S. Department of Agriculture. He was secretary of the division in 1959. Other officers of the division are Dr. L. B. Hein, Olin Mathieson Chemical Corp., vice-chairman; Dr. D. R. Boylan, Iowa State College, secretary; and J. D. Romaine, American Potash Institute, and W. J. Tucker, GLF Soil Building Service, vice councilors.

Pesticide Benefits Should Be Considered As Well As Risks

GOVERNMENT controls of the chemical, food, and agricultural industries should not be concerned solely with the elimination of all risk, but must be balanced against gains vital to the nation, David H. Dawson, a vice president of the Du Pont Company said last month. "To eliminate risk completely would be to bar progress," he said.

Dr. Dawson, a research chemist who now is a member of the executive committee and of Du Pont's board of directors, spoke, Dec. 8, in a symposium on "Science and Food—Today and Tomorrow," sponsored by the Food Protection Committee of the National Academy of Sciences—National Research Council. The symposium was held in Washington, D. C.

"Any consideration of risk without simultaneous evaluation of the potential benefit is . . . in grave danger of effectively preventing progress, or at least ensuring that it be achieved distressingly slowly," Dr. Dawson declared. "The problems involved in increas-

Research Grant To Minnesota

The University of Minnesota, St. Paul, has received a \$40,500 grant to conduct a three-year study on the fundamental absorption, retention, and physiological effects of herbicides and fungicides on plant cells. Source of the grant is the U. S. Public Health Service. The project is to be under the direction of T. H. King, plant pathologist, and A. J. Linck, plant physiologist.

Issue AOAC Official Methods

The ninth edition of *Official Methods of Analysis* for such products as foods, food additives, drugs, cosmetics, pesticides, feeds and fertilizers is now being distributed by the Association of Official Agricultural Chemists.

The book is available from the Association, Box 540, Benjamin Franklin Station, Washington 4, D. C. Its cost is \$17.50.

ing food supplies faster than population growth are of such magnitude that we need to accelerate and not to hinder their solution."

"The willingness of industry to risk capital," he said, "has been subtly but profoundly influenced by the changes in legislation and in legislative climate which have developed in the past several years. This seems to reflect a public—certainly a legislative—desire to reduce the risk of any harmful effect of any chemical additive to foods, and preferably to make that risk approach zero."

Further progress in chemical contributions to the food supply will depend to an important extent on the ability of the chemical and food industries to support the necessary research and to take the capital risks involved in manufacturing and marketing the products which research has uncovered. The costs and time required to establish safety of new and established food additives under present legislation must inevitably be reflected in the price of the product, he said.

Spray Study Urged In Canada

A concerted effort is needed in Canada to obtain and study information on "fallout" from chemical pesticides used in agriculture and elsewhere, Dr. Henry Hurtig of the Canada Department of Agriculture's research branch wrote last month in the *Agricultural Institute Review*.

The key problem, he said, is how to prevent the poisons that kill harmful insects from reaching the dinner table. He noted that the main difference between the Canadian and United States law is that the Canadian Food and Drug Act applies "only to food for human consumption." This means that no tolerances are established for pesticide residues on pasture, forage, or other feeds that are intermediate in the human food chain, he said.

So far, pesticide residual research has been "playing it by ear," said Dr. Hurtig, in emphasizing that modern agricultural techniques seem destined to swell the use of pesticides. Canada's diverse cli-

matic and crop conditions mean that research will have to be done on the imported pesticides, which are in the majority, to make sure they can be applied safely in Canada under the suggested techniques.

Griffith Joins API

Dr. W. K. Griffith has joined the American Potash Institute, Washington, D. C., as eastern agronomist serving the states from Virginia to Maine. He formerly was associated with the University of Arizona and Purdue University.

New Monsanto Appointments

Charles L. Fetzer, San Francisco, has been appointed a senior sales representative in Monsanto Chemical Company's Agricultural Chemicals Division.

Arthur E. Leisy, Anniston, Ala., is superintendent in the parathion department. Robert L. Olcott, Kansas City, Mo., has been appointed sales manager of the Agricultural Chemicals Division's western district.

Adequate Insecticide Use Increases Cotton Profits

ALTHOUGH twice as much insect control was required for two-bale cotton production, the net profit per insecticide application was six times as great as for half-bale production. These results, drawn from the South Carolina Five-Acre Cotton Improvement Contest, were presented at the Delta Council Conference in Stoneville, Miss., Dec. 1. Speaker was Dr. H. G. Johnston of the National Cotton Council, Memphis.

Speaking on profits in cotton insect control, Dr. Johnston said an uncontrolled infestation can greatly reduce or completely nullify any potential increase that might be expected from fertilization, irrigation, and other improved practices. "On the other hand, complete insect control cannot increase yields beyond the potential provided by these practices," the entomologist said.

In the South Carolina contest, farmers producing one-half bale per acre used about minimum requirements for a balanced fertilizer and an average of four insecticide applications. The net profit, Dr. Johnston said, was \$22 per acre, or an average profit of \$5.50 for each insecticide application.

The two-bale group used about 50 per cent more fertilizer and an average of seven insecticide applications. Net profit was \$240 per acre, or an average of \$34.30 per application.

The half-bale group produced cotton at an average cost of 31 cents per pound, the two-bale group at 15 cents per pound. This, Dr. Johnston said, points up the fact that efficient cotton production depends upon a proper balance of all improved production practices and no one of them alone will get the job done.

Foxboro Expands Sales



Schwarzler



Ehrisman

The Foxboro Co., Foxboro, Mass., has added a marketing division which will serve its associated companies in England, Canada, Holland, and Japan, as well as its U.S. markets.

Charles Schwarzler has been named vice president of marketing by Foxboro and will be head of the new division. Mr. Schwarzler has been associated with Foxboro for the past 26 years and was named manager of international operations in 1955. Henry O. Ehrisman has been named as a vice president and U.S. general sales manager. He has been with the company since 1936.

California Weed Conference

The California Weed Conference will be held in the California Hotel, Fresno, Jan. 24 to 26. Among those scheduled to appear on the program are: Walter S. Ball, State Department of Agriculture, who will moderate a panel discussion on organization of weed control districts; N. B. Akesson and W. E. Yates, University of California, Davis, who will discuss drift and residues of agricultural chemicals and their relation to application equipment, techniques, and weather; and Dr. Guy F. MacLeod, Food Machinery and Chemical Corp., Fresno, who will lead a panel discussion on weed control in crops.

Other topics to be considered at the conference will be: perennial weed control, industrial weed control, research, residues, and new weed problems. Stanley W. Strew, Colloidal Products Co., Sausalito, is president of the California Weed Conference.

B-I-F Advances Two

Charles J. Brex Jr., advertising manager since 1958, has been named director of public relations by B-I-F Industries, Providence, R. I., and Edward C. Ross, assistant advertising manager, succeeds Mr. Brex as advertising manager.



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Penco Animal Repellent

Development of a weather-resistant contact animal repellent has been announced by Pennsalt Chemicals Corp., Philadelphia. The repellent, containing thiram, is designed for use on forest nursery planting stock, fruit trees, ornamental plants, and nursery stock for protection against rabbits, meadow mice and, to a lesser extent, deer. The formulation was developed by Pennsalt's agricultural chemicals division in cooperation with the Weyerhaeuser Co.'s forestry research center at Centralia, Washington.

The repellent may be applied either during the dormant or growing seasons and is said to protect treated surfaces of plants for a period of approximately six months. Initial offering of the product, to be marketed as Penco Thiram Animal Repellent, is being made to forest tree nurseries and other nurseries engaged in production of nursery stock.

Aquatic Weed Society Meets

The 2nd annual Aquatic Weed Control Society meeting will be held February 14th and 15th in the

LaSalle Hotel, Chicago, Illinois.

Paul W. Eller, the society's publicity chairman, writes that the program will consist of biological discussions on relationship between weeds, algae, and lake nutrients, and a review of new aquatic herbicides by company representatives. Other interesting topics will be: a review of current field tests by research and regulatory agencies; legal aspects of aquatic weed control; and a discussion on application procedures, equipment, and general problems connected with applying herbicides and algaecides to waters.

Northeast Weed Meeting

All aspects of weed control are being covered by the more than 100 papers on the program of the Northeastern Weed Control Conference at the Hotel New Yorker, January 4 to 6.

Among the speakers are: Dr. R. D. Sweet, Cornell, "Status of Granular Herbicides"; Howard H. Campbell, County Agents Association, "Weed Control in Suburbia"; and Dr. S. N. Fertig, Cornell, "Promising New Chemicals for Weed Control."

Southern Weed Conference To Be Held In St. Petersburg, Fla.

THE Southern Weed Conference will open its 14th annual meeting at the Sorenson Hotel, St. Petersburg, Fla., January 18-20, with a general session on "the challenge of weed control - past, present and future."

Speakers for the general session will include David W. Staniforth, Iowa State University, "Crop-Weed Ecology in Relation to Weed Control Research"; Paul Y. Burns, Louisiana State University, "Weed Control in Timberlands"; W. B. Ennis Jr., U. S. Department of Agriculture, Beltsville, Md., "Weed Investigations - Progress and Potential"; and Dale E. Wolf, E. I. du Pont, Atlanta, "Industry's Responsibilities."

Following the general session, conferees will divide into groups for discussions of such topics as:

Weed Control in Agronomic Crops — Pre-planting and lay-by control in cotton, herbicides for weed control in peanuts, and toxicity problems, and application methods for herbicides.

Horticultural Crops — Evaluation of herbicide application methods, new chemicals and management techniques for weed control in pine nurseries, influence of herbicides on yields of certain vegetable crops, and late season grass control in potatoes.

Weed Control for Highways, Utilities, etc. — Vegetation control on Texas highways, residual effects of soil sterilants, and application of a dormant spray.

Development from industry will be detailed by 12 speakers representing various chemical companies during the last session.

K. D. Jacob Retiring



Kenneth D. Jacob, recognized as a world authority on fertilizer chemistry and technology, will retire January 31 as special assistant to the director, Soil and Water Conservation Research Division, ARS, USDA, after more than 42 years of federal service. The division is planning to hold a retirement party and reception for Mr. Jacob at Beltsville, Md., on Jan. 31.

Mr. Jacob entered the Chemical Warfare Service in 1918. In 1922, he became associated with the fertilizer research work of the USDA and has served continuously in that field since then. He served as head, Fertilizer Investigations Research Branch of the Division from 1947 until he became special assistant to the director in 1959.

IMC Advances Two

Gerd W. Kraemer, regional sales manager in Minneapolis, Minn., has been named assistant sales manager of the Materials Department by the Agricultural Chemicals Division of International Minerals & Chemical Corp., Skokie, Ill. He is replaced at Minneapolis by Alexander McBride, who had been sales manager in Kansas City.

Form Mexican Company

Velsicol International Corp., C.A., Nassau, Bahamas, has formed a subsidiary in Mexico. The name of the Mexican company is Velsicol Internacional de Mexico, S.A. de C.V.

First Food Conference

Representatives of 50 food industry organizations will conduct the first annual meeting of the National Food Conference Association, Inc., in Chicago January 12, 1961.

The meeting will start at 10 A.M. in the Palmer House, according to Charles B. Shuman, association president and president of the American Farm Bureau Federation, one of the members of the association.

Mr. Shuman said the annual meeting is open to all representatives of the food industry and related fields whether or not they are members of the National Food Conference Association.

Purpose of the National Food Conference Association, Inc., is to present, to the public, information on the economic, social and nutritional importance of food in the life of American people.

CACA Meets Jan. 26

The tenth annual meeting of the Colorado Agricultural Chemicals Association will be held Jan. 26 and 27 at the Cosmopolitan Hotel in Denver.

Stauffer Office Moved

Stauffer Chemical Co.'s Agricultural Chemicals Division has moved its Northeast Regional Sales Department to 555 Fifth Ave., New York. Also located at that address is Dr. P. D. Peterson, technical sales director for the division and Dr. Ray Kriner, agricultural research and development representative.

Bemis Acquires Systemation

Bemis Bro. Bag Co., St. Louis, has acquired a substantial interest in the Systemation Corp., a St. Louis area firm which specializes in the development of integrated and automated packaging systems and machinery.

According to F. G. Bemis Jr., director of allied operations for Bemis, the acquisition will "strengthen our diversification pro-

gram into allied packaging fields and supplement the assistance we already provide to industrial customers."

Black Joins Diamond

Dr. Donald M. Black has joined Diamond Alkali Co., Cleveland, Ohio, as manager of development and market research. He had been with Monsanto Chemical Co. for 13 years.

CSC Names Ashworth to Sales

Commercial Solvents Corporation has named Thomas E. Ashworth to its expanding agricultural chemical sales staff. Mr. Ashworth is assigned to the Southeastern district with headquarters at the company's Atlanta, Georgia, office. He will travel in Florida, except the Northwestern section, and reside in Gainesville. Prior to joining CSC, Mr. Ashworth sold pesticides in the southern states.



THE Marion MIXER IS THE LEADER

FOR FERTILIZERS, AGRICULTURAL CHEMICALS & POWDERS

THE Marion MIXER offers better and lower cost mixing for the chemical industry. An exclusive Mixing and Blending Action makes possible the mixing of any top quality mixed product at less cost.

UNIFORM

A uniform mix is assured time after time no matter how complicated the formula and with laboratory exactness.

ACCURATE

If the formula is right — the MARION MIXER will mix it with complete accuracy.

THE MARION MIXER, now in use in many chemical plants throughout the country, is designed to produce the highest tonnage at the lowest possible cost. Also, its simple but efficient design makes it an ideal special formula mixer.

The MARION MIXER is the leader for mixing: Dry and semi-wet chemical powders—Agricultural chemicals — Fertilizers — Materials for chemical processing plants — Insecticides.

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DDVP Patent To Shell

A patent on the insecticide DDVP (0,0-Dimethyl 0,2,2-dichlorovinyl phosphate), has been issued to Shell Development Company. DDVP is sold by Shell Chemical Company under the trademark Vapona insecticide.

In addition, Shell Chemical recently has obtained a new label

acceptance on Vapona which allows pest control operators to spray a $\frac{1}{2}\%$ solution of Vapona insecticide in the normal manner in households, restaurants, theaters, food processing plants, industrial plants, and warehouses for the control of flies, fruit flies, gnats, cockroaches, ants, spiders, silverfish and other insects.

450 Participate In 37th CFA Convention

FOUR hundred and fifty persons participated in the thirty-seventh annual convention of the California Fertilizer Association, held at Hotel del Coronado, Coronado, California, November 13 through 15, 1960. James F. Sloan, Salinas, was elected president for 1961, succeeding D. W. Galbraith of Woodland. Other 1961 officers are John N. Williams, Chula Vista, vice president; L. M. Roberts, San Francisco, treasurer; C. E. McFaddin, El Centro, secretary; and Sidney H. Bierly, Sacramento, general manager. L. M. Duckworth, Fresno, and James Bonaventura, Edison, were elected for 3-year terms on the board of directors.

Tyler Macdonald, senior vice-president and marketing director, Hixson and Jorgenson, Inc., Los Angeles advertising concern, spoke during the business session on "Stand Up and Be Counted." His subject was tied to support of America's private business enterprise system.

Mr. Macdonald reviewed several accomplishments of the fertilizer industry and said that early industry scientists, such as Liebig,

Among directors of the CFA for 1961 are: (left to right) L. M. Roberts, Shell Chemical Co., San Francisco; L. R. Hamilton, California Chemical Co., Ortho Div., Richmond; W. M. Cline, American Potash & Chemical Corp., Los Angeles; J. N. Williams, General Fertilizer & Supply Co., Chula Vista; James

Gilbert, and others contributed in major aspects more than did Einstein to human progress. He pointed out that fertilizer is a necessary crop production tool, and should be sold on the basis of the added profit it will bring the grower, rather than on a price basis. "The business that relies on lower prices usually goes broke or the government takes it over."

CFA President Demont W. Galbraith, in his opening address, said he has noted with alarm the recent steady decline in the price of fertilizer materials to the consumer in the face of increasing costs of doing business. A factor in the changing pattern is the up-surge of the manufacturing co-operative as "the biggest single threat to our economic lives that exists today." It is insidious in that it does not correct any evils, but instead, because of its tax privilege status can well bring on lessened industry progress. Private business enterprise has developed new methods and competitive marketing practices. He urged support of H.R. 3848 which would bring about a greater degree of tax equalization.

F. Sloan, J. F. Sloan Co., Salinas; James Bonaventura, AFC, Inc., Edison; D. W. Galbraith, Agriform Chemical Co., Woodland; C. E. McFaddin, Imperial NH₄ Service Co., El Centro; Howard H. Hawkins, Golden State Plant Food Co., Glendora; and Sidney H. Bierly, California Fertilizer Assn., Sacramento.



Burlap Consumption Down

For the first eight months of this year, U.S. burlap consumption stood at 569.2 million yards, some 17 million yards lower than the previous year. The sharp rise in burlap prices in the American market—up more than 25 per cent during the past six months is believed to be a major factor in the drop in consumption, along with competition from multiwall bag manufacturers. In the U. S., 70 per cent of the burlap consumed is used in bags.

Co-op Building In Nebraska

An \$8 million anhydrous ammonia fertilizer plant will be built in Hastings, Nebraska, by the Consumers Co-operative Association. Plans call for the production of 150 tons of anhydrous ammonia per day.

Ortho Appointments

The Ortho Division of California Chemical Co., Richmond, Calif., has announced a series of appointments that have been made throughout the country. Among those appointed to new positions are: Robert Hike, sales supervisor for the northern California area; George Sley, supervisor of branch services at the West Palm Beach, Fla., office; Charles Standley, agricultural sales representative and field man for the Salt Lake City, Utah, district; James T. Williams, garden and home sales representative in Boise, Idaho; and Donald L. Lake as a sales representative. In addition, J. P. Goode has been appointed as a field research entomologist for the company. He had been with the New Mexico State Department of Agriculture.

Lease Fertilizer Equipment

Fertilizer manufacturers can now lease equipment for terms as long as 6 to 12 years under a new plan announced by Nationwide Leasing Company, Chicago.

Companies possessing a tangible net worth of \$1 million are eligible for 6-12 year leases for \$25,000 worth of equipment.

AAI Meeting Jan. 11-13

Emphasis will be on the agronomic aspects of direct application ammonia as the Agricultural Ammonia Institute holds its 10th annual convention in Memphis, Tenn. Jan. 11-13.

Speakers will include Dr. W. P. Martin of the University of Minnesota, an authority on ammonia use and research in the North Central States; Perrin Grissom, agronomist at Delta Branch Experiment Station, Greenville, Miss.; and Dr. R. L. Beacher of the National Plant Food Institute. All will discuss ammonia's use and future in various areas.

Presiding will be Carl J. Bauersman of Southern Michigan Nitrogen Co., Midland, Michigan, president of the AAI.

Sturtevant Expands Line

The Sturtevant Pulver-Mill, an impact mill with integral air classifier, introduced as a 5000-lb.-an-hour unit in May 1959, now is available for small-quantity grinding of soft and medium-hard materials.

The introduction of a 15-inch, 25-horsepower impact mill capable of producing in the hundreds-of-pounds-an-hour range — up to a ton and a quarter — marks the second addition to the line since the mill was introduced 18 months ago. Last May, Sturtevant announced the availability of mills capable of crushing up to 15,000 lbs. hourly.

V-C Names Two To Sales

Virginia-Carolina Chemical Corp., Richmond, Va., has appointed Earl T. Grassit and Donald E. Kingsley as assistant managers of its triple superphosphate sales department. Mr. Grassit is responsible for triple sales west of the Mississippi River and Mr. Kingsley's territory is east of the river.

Royster Names Hamilton

Nido L. Hamilton has been appointed assistant sales manager of F. S. Royster Guano Company's

Norfolk sales division, which covers portions of eastern North Carolina and eastern Virginia. He succeeds T. C. Dula who has been appointed sales manager of the Price Chemical Company Division of F. S. Royster, Louisville, Ky.

Bioferm Joins IMC

Bioferm Corp., which recently gained national prominence for its discovery and development of Thuricide, the microbial insecticide, will become a part of International Minerals & Chemical Corp., Skokie, Ill.

Officials of the two companies said that final terms of the stock transaction agreement by which IMC will acquire Bioferm still are being worked out. Bioferm is jointly owned by George Gelman and Jerry M. Sudarsky. Bioferm's plant in Wasco, Calif., will continue without change as an operating unit of IMC under the Bioferm name.

Ralph E. Fraser Dies

Ralph E. Fraser, vice president of Summers Fertilizer Co. and Northern Chemical Industries, both of Baltimore, Md., Bangor and Searsport, Maine, died last month after a heart attack. He was 66 years old. He had been with the Summers concern and its affiliates since 1925.

Bag Division Changes

A number of executive changes in its bag division have been announced by the Union Bag-Camp Paper Corp., New York.

Harry Recher, former director of flexible packaging sales, was named manager of bag sales. William Mellick, former director of chain store sales, was appointed director of flexible packaging sales and Frank Little, who continues as director of standard products sales, has been given the additional responsibility of supervising chain store sales.

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IT'S IN THE BAG!

• **ASSURE YOUR PACKAGE:**
Shipping and carrying strength...
Moisture protection...
Sift-proof closures...
Neat appearance.

• **ASSURE YOUR PRODUCT:**
Safe, compact packaging...
Long shelf life...
Fresh quality.

• **TESTED AND PROVEN FOR:**
Insecticides, fertilizers, chemicals, cement paint, wheat paste, milk powder, dog foods, briquettes, corn meal; powders and other granular products.

▲ SIMPLE ADJUSTMENT TO PROPER BAG HEIGHT.
▼ EXIT VIEW.

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71

Can you use NON-SWELLING ABSORPTIVE

Montmorillonite



PIKES PEAK CLAY

Approximate chemical analysis

Loss (at 105°C.)	0.60%
Further Loss on Ignition	3.25%
Silica (SiO ₂)	73.77%
Alumina (Al ₂ O ₃)	12.66%
Ferric Oxide (Fe ₂ O ₃)	4.16%
Magnesia (MgO)	3.80%
Calcium Oxide (CaO)	0.34%
Ferrous Oxide (FeO)	0.08%
Sodium Oxide (Na ₂ O)	0.04%
Potassium Oxide (K ₂ O)	0.09%
Titanium Dioxide (TiO ₂)	0.79%
Arsenic Oxide (As ₂ O ₃)	0.00056%
Mercuric Oxide (HgO)	Less than 0.00005%
Lead Dioxide (PbO ₂)	Less than 0.00007%
Phosphorus Pentoxide (P ₂ O ₅)	0.22%
Sulfate (SO ₄)	0.17%
pH around 5	
None found.	

Currently used as:

- Carrier (liquids & solids)
- Diluent • Extender
- Coagulant Aid
- Parting Agent
- Coating Agent
- Bleaching of chemicals, animal, mineral & vegetable oils
- Filter Agent
- Absorbent for liquids, chemicals, greases, oils

PHYSICAL PROPERTIES — Like all mined products of this nature, physical properties of Montmorillonite will change in various degrees, determined by mesh size and quantity.

WRITE FOR SAMPLES — Write immediately for necessary samples, mesh sizes available and other technical data for further exploration into advantages of Montmorillonite in suiting your specific needs.



Marketing Urged In England

Christopher Soames, Minister of Agriculture, Fisheries, and Food (England), told the sixth meeting of the Horticultural Marketing Council, held Nov. 22 in London, that he was "struck by the infinitesimally small proportion of the turnover of the industry as a whole — horticulture and agriculture together — which is spent on marketing, despite all that marketing means in this day and age."

"But I am glad to see," he continued, "the number of forward-looking and forward-thinking people in the industry who realize that this has got to be set right.

"This council has a tremendous task ahead of it. It has to capture the imagination and support of the industry. This will enable you to help them.

"Yours is a most challenging job and I know of the great start you have made. This council could make a tremendous difference to the industry if it goes well."

o

W. Va. Advances Elsas, Carnes

John M. Elsas and Sheldon Y. Carnes have been assigned new divisional responsibilities for West Virginia Pulp and Paper.

Mr. Elsas has been appointed to the new position of sales manager for the entire division. Presently located in New Orleans, Mr. Elsas will move to division headquarters in New York where he will direct West Virginia's sales in the multiwall field. Mr. Carnes has been named market development manager for the division.

o

15th Wisconsin Conference

The 15th annual Wisconsin Pesticide Conference with Industry is being held Jan. 5 and 6 at the University of Wisconsin, Madison. Among the speakers, and their topics, are E. H. Fisher, U. of Wisconsin, and H. E. Halliday, Wisc. Department of Agriculture, "A Look at Future Labeling Requirements"; K. P. Bucholtz, U. of Wisconsin, "Weed Control In Corn"; K. G. Weckel, U. of Wisconsin,

"Effects of Pesticides on Acceptance Qualities of Fruits and Vegetables"; and D. N. McDowell, Wisc. Department of Agriculture, "State Residue Laboratory — A Progress Report."

Philip Garman Retires

Dr. Philip Garman retired Dec. 31 after 41 years with the Connecticut Agricultural Experiment Station, New Haven. He was the guest of honor Dec. 7 at a testimonial banquet held in Northford, Conn. Principal speaker was Dr. E. F. Knippling, director of the entomology research division, U.S. D.A., Beltsville, Md.

Antara Names Distributor

Missouri Solvents & Chemicals Co., St. Louis and Kansas City, Mo., has been appointed distributor for two product lines by Antara Chemicals, a Division of General Aniline & Film Corp., New York. Under the new arrangement, Missouri Solvents will handle Igepal surfactants and Cheelox chelating and sequestering agents in a territory that includes the St. Louis and Kansas City areas as well as south Illinois, west Kentucky, Tennessee, north Arkansas, Missouri, Kansas, south Iowa, and southeast Nebraska.

Monsanto Shifts Two

Two members of the field sales staff of Monsanto Chemical Co.'s Agricultural Chemicals Division have been relocated. Darwin Holland, sales representative at Jackson, Miss., is transferred to Columbus, Ohio, to service the Cincinnati district. Clairborne L. Barber, assistant sales manager for the New Orleans district, moves from that city to Jackson, adding to his responsibility those accounts previously handled by Mr. Holland.

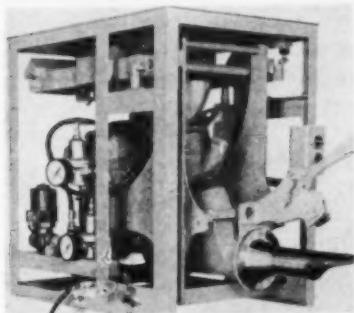
Reid Named By Davison

George H. Reid Jr. has been named manager of mixed fertilizer operations in Baltimore, Md., by the Davison Chemical Division of W. R. Grace & Co. He has been with Davison since 1951.



Equipment, Supplies, Bulletins

Valve Bag Packer



St. Regis Paper Co., New York, is offering a compact valve bag packer in two models. The Easiflow-I for granular free-flowing materials, and the Easiflow-II (pictured) for powdered dusty materials.

Screw packers, the machines feature accurate weighing, high production, low headroom requirements, uniform product flow, and easy and dust-free operation. The packers are designed for the filling of 25 pound to 50 pound bags.

Hercules Insect Notes

A series of bulletins is issued periodically by Hercules Powder Company, Wilmington, Del., in a "Hercules Agricultural Chemicals" series. Each bulletin deals with control of some specific pest. Among the early bulletins of 1960 were "The Lygus Bug in Seed Alfalfa," and "Controlling Insect Pests of Livestock with Toxaphene."

Illustrations of specific insect pests, their habits and control measures are included in each brochure.

Check-Weighing Bulletin

A bulletin on check-weighing systems has been published by Weighing & Controls, Inc., Hatboro, Pa. The systems covered in the bulletin can be applied to all

types of dry or liquid, single- or multi-unit containers to provide a continuous check on the filling accuracy of packaging equipment.

Tree Feeding Booklet

A booklet, "How To Fertilize Trees and Measure Response," is being offered by the National Plant Food Institute. Designed for use by forest landowners and managers, it is intended to furnish forest tree fertilization information. The booklet was prepared by Stanley P. Gessel and Kenneth J. Turnbull of the school of forestry, University of Washington, and F. Todd Tremblay, NPFI Pacific Northwest Regional Director.

Farm Market Study

The research department of Wildrick & Miller Inc., New York, advertising and sales counselors, has prepared a farm market study entitled "10 Years Later, Still Fewer, Larger, Richer." The booklet is the fifth in a series of farm market studies prepared by the firm.

Palletless Bag Handling

A new fork truck attachment for the palletless handling of bagged goods is being offered by the Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich. The new attachment consists of two scoop-shaped arms which are hydraulically actuated to clamp bags.

Scoop arms are 45 inches long and can be spread 67 inches wide or clamped to 17 inches. The attachment has a maximum capacity of 3,500 pounds and is designed to fit all Clark fork trucks.

Penco Biotrol Bulletin

Pennsalt Chemicals Corp., Tacoma, Wash., has prepared a technical bulletin describing Penco Biotrol BTB, its biological insecticide preparation of the bacterium *Bacillus thuringiensis*, Berliner. The product is suitable for use in conventional dust or spray application equipment in the control of leaf-chewing larvae of certain Lepidopterous insects found on crops.

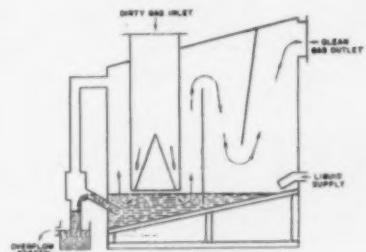
Formulations available include 5D dust — containing five billion viable spores per gram and 25W wettable powder—containing 25 billion viable spores per gram. The bulletin describes the uses, mode of action, compatibility, and residual activity of the product.

Plastic Scrubber Shown

At the 1960 Fertilizer Industry Round Table meeting, (Wash., D. C., Nov. 3-5) Joy Manufacturing Company, Los Angeles, exhibited a plastic scrubber for use in fertilizer plants. To protect the interior of the tank and the piping from being attacked by dissolved fluorides, all surfaces coming in contact with any of the corrosive materials are lined with dynel fabric laminations.

The scrubber is designed to handle 21,000 cfm at a temperature of 167° F. Scrubbing liquid is a mixture of 25% dissolved ammonium phosphate and ammonium sulfate and 5% sulfuric acid. In operation, the scrubber handles gases resulting from the reaction of ammonia with phosphoric and sulfuric acids. The line diagram below illustrates material flow.

The Turbulaire-Doyle scrubber is a development of the Consolidated Mining and Smelting Company of Canada Ltd.



Pfizer Offers Films

Eleven motion picture films on science, medicine, and agriculture are offered to the public in a newly revised 12-page catalog published by Chas. Pfizer & Co., Inc., New York.

The Pfizer films, all 16mm sound, are offered on a loan basis to representatives of schools, colleges, farm audiences, medical and pharmacy groups, civic and service organizations, parent groups, and others.

Work Clothing Catalog

M. Setlow and Son, Inc., New Haven, Conn., is offering a 1960-61

catalog that describes and illustrates types of cotton work clothing manufactured by the company.

Adjustable Sewing Pedestal

A sewing pedestal offered by Richardson Scale Co., Clifton, N. J., will adjust vertically and horizontally to suit various bag heights and widths, and different sewing heads, filter cords, and tape sealers.

Vertically, the height of the needle can be varied from 20½ inches minimum to 48 inches maximum. The horizontal adjustments range from 19 inches to 27 inches.

Vulcan Announces Availability of New Plastic-Grip Handle



Gordon D. Zuck, president, Vulcan-Associated, shows handle to company officials.

DESIGNED to glamorize merchandising appeal of steel pails, at the same time reducing scratching and marring of pail surfaces during shipping and handling, a new "Pearl-White Plastic Handle" has been developed and announced by Vulcan-Associated Container Companies, Inc., Birmingham, Ala.

The "Plastic Grip's" construction is said to lessen the actual contact between adjacent containers. Also, under severe impact, it acts as a "shock absorber," all but eliminating denting and deforming, especially significant now with the increasing trend towards lighter gauge, less costly steel pails.

Vulcan's market research study revealed two factors:

- (1) that the design of pail handles and the Pearl-White color adds to the overall attractiveness and

buyer appeal of both lithographed and solid color pails, and also complements package identification—

- (2) the Plastic Grip, designed with nine tiny air cells, acts as a cushion to the hands when the pail is lifted. It will not crack or splinter, eliminating possibility of injuries inherent with outmoded wooden types.

The new Pearl-White Handle will be a stock item at all seven Vulcan plants in the United States and Canada. To facilitate comparison tests on users' own pails, Vulcan is offering a free sample package of a complete handle. Those interested are invited to write the executive offices of Vulcan-Associated Container Companies, Inc., P. O. Box 1510-NR, Birmingham, Alabama.

Scrubbers for Dust Control

Multi-Wash scrubbers for dust control and dust recovery in fertilizer manufacture are offered by Claude B. Schneible Company, Detroit, Michigan. The scrubbers may be located outside the building, in the roof structure or on the roof itself. Scrubbers are supplied of steel alloys, coated or uncoated, or other special materials. Special liquids may also be used for contact.

Schneible also offers entrainment separators, settling tanks, skimmer type concentrating tanks, pressure vessels and storage tanks.

Technical data is available from Claude B. Schneible Co., Dept. AC, P. O. Box 296, Roosevelt Park Annex, Detroit 32, Michigan.

Automatic Closing Machine

An automatic bag closing machine is being offered by the Minneapolis Sewing Machine Co., Minneapolis, Minn. With the new machine, a filled bag automatically is conveyed through a bag feeder where it trips an automatic starter for the sewing head. After the bag is sewn, the sewing head stops automatically and the threads are cut by an automatic thread clipper.

Mite Control Brochure

How to control mites in citrus crops safely and efficiently is the subject of a brochure offered by Niagara Chemical Division of Food Machinery & Chemical Corp., Middleport, N. Y.

The brochure outlines recommended application procedures for Tedion miticide on oranges, grapefruit, tangleos, citrus citron, tangerines, limes, and lemons.

Vibrating Storage Bin

Vibra-Screw Feeders, Inc., Clifton, N. J., is offering a storage bin that is suspended on rubber mounts and is equipped with a vibrating external activator to permit maximum hopper capacity with a bin bottom that is nearly flat.

SAFE APPLICATION

(From Page 59)

above the surface of the soil. When held 1 inch above the soil, the band from a 2½-inch inner funnel is approximately 4 inches wide. When held 1 foot above the soil, the band ranges from 8 to 12 inches; when held 2 feet above the soil, it is approximately 2 feet wide. With a delivery opening of $\frac{1}{2}$ inch in the tube above the inner funnel, 30- to 50-mesh attaclay is delivered at a rate of approximately 50 pounds per acre at a rapid rate of walking. If the attaclay carrier contains 5% active material, about 2½ pounds per acre of active material is delivered. Where more exact dosages are required, markings on the plastic tube can be made as described to indicate the quantity to be delivered for a given length of row.★

ROUND TABLE

(From Page 38)

be solved, and is a matter Foxboro is taking under study.

In commenting on magnetic flow meters,—which are finding increased use in metering "difficult" liquids such as phosphoric acid, Mr. Strauss remarked that one reason the magnetic meter is so successful in this application is because it has no flow restrictions. It is not affected by changes in viscosity. Electrodes flush-mounted in a corrosion proof meter wall scan flow rate magnetically and send a linear proportional signal to an electronic receiver. Maintenance, he pointed out, is practically nonexistent.

A. Simmons also discussed the magnetic flow meter, and offered a series of notes on its operation, installation and handling.

D. L. Warren, discussing gravimetric feeders in fertilizer production called attention to several papers presented during the meeting which emphasized the wide chemical variations in fertilizer ingredients. "While they are reason-

ably wide from a percentage standpoint," he said, "they are probably not nearly as wide as physical variations," such as bulk density. It is most important, he continued, to have feeding equipment which can compensate for density changes. When this is done, an accurate flow is maintained by weight, and this, of course, adds up to fulfilling closer to grade—more profits.

"Gravimetric feeders offer a great deal of flexibility in formulation, if they are of a type which have a wide range of rates. They can generally be added to existing plants without taking up too much extra space. If they are set up as a multiple application, by that I mean one feeder for each of the generally used ingredients, they can all be set to deliver their particular part of the formula directly to the ammoniator and eliminate a batching step. With these feeders secondary instrumentation, such as totalizers and recorders can be used effectively."

In commenting on installation of a gravimetric feeder, Mr. Warren advised that the following points be among those observed: (1) Avoid excessive vibration; (2) Never mount directly over the ammoniator; (3) Use a bin gate for isolation of the feeder from the hopper; (4) Have unit accessible to operators and maintenance men; (5) Provide some means of hopper agitation; (6) Provide a bar screen close to inlet chute of the feeder.

Mr. Warren urged that plant men treat the gravimetric feeder with care to which such an "instrument" is entitled. "It is not a rock crusher," he said. "Try to limit the personnel authorized to operate and maintain the feeders to a few who have been checked out on the unit and know what they are doing. One of the greatest problems in this field is people with 'fingeritis'. These are the people who don't know what they are doing, but walk up and turn a knob, or reset a rate changer, move a tare weight, before they have analyzed the problem and isolated it accord-

Danitra

Keeping Pace

with the ever widening demand for

WATER SOLUBLE FERTILIZERS



The custom blending of water soluble fertilizers has become an exact science at our specially equipped and staffed plant at Metuchen, New Jersey.

RAILROAD SIDING-LOADING facilities put us in an excellent position to offer genuine economies on perfectly blended bulk materials.

BRAND NAME PACKAGING in units of 1 pound or more (your formula or ours, quality controlled all the way) and drop shipping under your labels and shipping tags.

Plus

the extra value features of adding to your formula, Davies' own Trace Element product.

NUTRAMIN

the only water soluble blend of MANGANESE, IRON, COPPER, ZINC, BORON and MOLYBDENUM

NUTRAMIN may also be ordered in 100 lb. drums for shipment to fertilizer processors who wish to blend at their own plant.

Davies Nitrate Co.

INCORPORATED

118 LIBERTY STREET NEW YORK 6, N.Y.

ing to the Distance-Weight-Time method of calibration."

The speaker listed the following features to look for in gravimetric feeder: 1) variable speed belt; 2) positive drive belt; 3) supplemental power for operation of the control gate; 4) shear pins.

(To Be Continued)

WASHINGTON REPORT

(From Page 50)

Much the same kind of story can be found in relation to other commodities in Africa and in most of the so-called developing nations of the world. The most important single thing they can do to move ahead in peace toward prosperity is to use more pesticides and fertilizers in their agriculture.

These are the kinds of stories, say industry leaders here, which make a real impact upon those city people whose main concern is protecting human life and health, and in moving the economies of other peoples ahead.

Right here at home, over one million farms and ranches are now carrying out conservation projects under the Agricultural Conservation Program. These farms and ranches contained 32% of all U. S. farmland. Conservation practices include brush and weed removal, establishment of grass, legumes and trees, improving waterways, restoring flood damaged land, and so on. Both fertilizers and pesticides have a place in many of these conservation practices.

ACP is administered nationally by the Agricultural Conservation Program Service, and in the states and 3,069 farm counties by farmers who are members of locally-powerful Agricultural Stabilization and Conservation Committees.

The Federal Government shares costs with the farmers who undertake conservation projects. Proper use of pesticides and fertilizers is, in the best sense, a conservation practice. Many here feel that this is a fact which the general public should be told more effectively during 1961.

How much does it actually cost a farmer for pest control? A Michigan study reported by USDA here discloses that the total cost for pest control on apples in the state runs about \$53 an acre, with a cost of \$4 per acre for field corn and sugar beets, \$9 for snap beans, \$11 for tomatoes, \$12 for cabbage, and \$25 for cherries.

What many in the pesticide industry tell us is that they are looking for more such figures, especially relating the cost of pesticides to the increase in net return they bring.★★

PUBLIC HEALTH

(From Page 40)

nature of the dairy farmer's need for pest control and the policy of allowing no pesticide residues in milk.

Under present conditions, Dr. Zavon said, pesticide residues do

not appear to present a public health problem. There can be no question, however, that the whole matter needs continued review, he concluded.★★

NAC SURVEY

(From Page 33)

to our food supplies, our health, and our comfort.

Both the opening up of Africa to wide-scale transportation facilities and the opening of the St. Lawrence Seaway tend to increase that threat. The former is a potential source of infestations by species of pests new to the United States. The latter offers an additional 1400 miles of coastline open to international commerce and the possible invasion of pests carried inland with foreign cargoes.

Growing awareness of the need for improved pest control abroad as well as in the United States has been boosting the industry's exports of many types of pesticides. Value of pesticide exports in the first half of 1960 totaled over \$47 million, compared with \$86 million for all 12 months of 1959. Over half the exports were accounted for by DDT, much of this going into overseas malaria eradication programs. Large amounts of fungicides, fumigants, herbicides, and other insecticides also were exported in the first half of 1960.

Pending any unforeseen developments here or abroad, NAC

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predicts, pesticide sales are headed for additional gains in 1961. Growing population, the need for more efficient food and fiber production in the U.S. and abroad, and the trend toward the creation of a pest-free type of outdoor living all are playing their part in continuing to raise the level of usage of the pesticide industry's products. ★★

IMPROVED SPRAYING

(From Page 59)

J. G. Futral, head of the agricultural engineering department, Georgia Experiment Station, described precision fertilizer placement equipment. "Commercial fertilizer hoppers may vary as much as 50 per cent in their output rate even when a uniform material is used," Mr. Futral said. He added that an experimental planter developed in Canada suggested a design for satisfactory metering hoppers. The completed unit has proved to be easy to load, he said, and it has cut in half the time required to carry out complicated fertilizer tests. The largest error yet found for any increment of row is two per cent, he added. Mr. Futral also described a liquid fertilizer unit designed on a piston and cylinder principle.

He recommended that fertilizer openers be mounted so that any variation of the distance from the fertilizer band to soil and to the seed is held to a minimum. He said good results have been obtained in heavy clay soils by the use of curved openers which provide considerable suction. He also recommended that planters be mounted separately so that variations in the angle of the tool bars caused by pressure do not affect the depth of planting. ★★

LISTENING POST

(From Page 63)

and for the nematode counts about 3 months after treatment. Results were comparable, but the onion

test was faster and more reliable for studies on soil factors affecting distribution of the chemical in the soil at time of application, according to Rinkov and his associates.

Recent Developments

J. N. Sasser, W. E. Cooper, and T. G. Bowery (5), of North Carolina State College, studied control of the sting nematode, *Belenolaimus longicaudatus*, obtained with 1,2-dibromo-3-chloropropane (DBCP) applied as preplanting, planting, and postplanting treatments, and also as split applications, half at preplanting or planting and half 3 or 6 weeks after planting; and with *O,O*-diethyl *O*-2-pyrazinyl phosphorothioate (EN 18133) applied at planting time. Their studies took into account not only control of the nematode, but influence of successful control on commercial returns to peanut growers. They found that control resulted in more vigorous plants, increased yields, better quality of nuts, and higher market prices, and consequently in substantially increased acre values. Planting and preplant treatments were equally effective, and both gave better control than postplant treatments. However, in fields where nematode infestation is discovered after plant growth has started, postplant applications all at one time would increase the value of the crop.

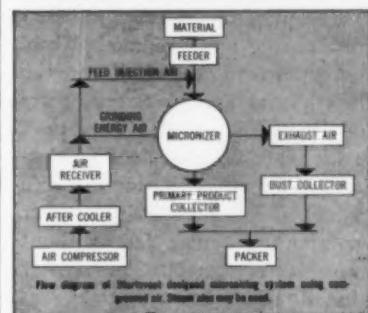
Analysis showed low total bromide content in shelled peanuts. Sasser and his associates stated, however, that peanut hay from treated fields should not be fed to milk cows or to animals being finished for slaughter.

Methyl Bromide Fumigation

Quarantines on movement of soil, plant parts, farm machinery and equipment, or other materials that might spread the soybean cyst nematode, *Heterodera glycines*, have led to investigation of methods of killing the nematode in infested material. J. N. Sasser, of North Carolina State College, and

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Grover Uzzell, Jr., of the Plant Pest Control Division, Agricultural Research Service, United States Department of Agriculture (6), conducted controlled tests to determine dosage levels of methyl bromide required to eradicate the nematode at various temperatures and exposure periods. They used an airtight 100-cubic foot fumigation chamber with temperature control or a polyethylene cover enclosing 375 cubic feet without temperature control. Soil heavily infested with the nematode was the test material. Methyl bromide dosages of 1 to 16 pounds per 1000 cubic feet were tested. Eradication of the nematode in the fumigation chamber required the following combinations of temperature, exposure time, and dosage levels per 1000 feet cubic feet: 50°F, 2 hours 16 pounds; 50°, 4 hours, 8 pounds; 60°, 2, 8; 70°, 2, 8; 70°, 4, 4; 80°, 2, 8; 80°, 4, 4; 90°, 4, 2. The polyethylene cover gave results similar to those obtained in the airtight fumigation chamber. ★★

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FERTILIZER VIEWS

(From Page 55)

contains naturally 5 per cent or more calcium carbonate and/or calcium sulfate.

A report by H. Heimann, given to the 6th Congress of the International Potash Institute in Madrid in 1958, explained the effect of irrigation with saline water and the balance of the ionic environment in the root zone. It is an excellent study and well documented. I can only refer briefly to one or two conclusions as pertinent to this general discussion on sodium. Hermann states that "under saline conditions the plant nutrition concept should be replaced by the broader one of a balanced ionic environment . . . The uptake of sodium by the plant is strongly impeded by the presence of potassium in relatively low ratios.

The problem of sodium effects on soil structure and plant health is complex. In the light of recent research it is obvious that the simplified, older concepts should be revised to provide for the more comprehensive concept of balance of the ionic environment in which the presence of calcium and potassium ions conditions the ultimate effect. ★★

PEST ROUNDUP

(From Page 61)

Central-Niland areas of Imperial County, California. Large blocks of seedling beets were destroyed in the county.

Bark Beetles were, perhaps, the most prominent forest insects reported on during November. Although activity of these insects was on the decline in eastern Texas, they were responsible for the loss of 10,000,000 board feet of saw-timber and 30,000 cords of pulpwood, in spite of an aggressive control program. In Virginia, bark beetles were responsible for loss of trees in localized areas of North-

ampton and Princess Anne Counties.

A moderate infestation of the Nantucket pine moth on a Scotch pine plantation of 20,000 3-year-old trees was reported from Pennsylvania. The insect was common on Virginia pine in some areas of Fairfax County, Virginia, and heavy on young pines in Camp County, Texas. In Payne County, Oklahoma, 6 larvae and 134 pupae were found alive in 250 tips in a pine planting checked. An additional 6 larvae and 9 pupae of the moth were found dead in the tips examined.

Cool weather was responsible for the increase of houseflies in homes to nuisance proportions in many areas of Oklahoma during November. Flies were also common to heavy around barns and livestock pens in the east central part of the State. Faceflies were a problem in homes during the warm period of November 14-18 in localized areas of Tippecanoe and Warren Counties, Indiana. ★★

NITRATE OF POTASH

(From Page 32)

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SALES

(From Page 29)

expected real argument at this point, but it did not materialize.

We then began a series of educational meetings with the distributors who had been selected in order to give them product training, market applications, and sales techniques.

Under the heading of product training, we explained what MH-30 is and how it works. We demonstrated proper use of the chemical, stressing that the grower could get maximum benefit from the chemical only when he applied it correctly. Along with actual demonstrations, we used charts, slides and films, and then we made these materials available to the distributor so that he could use them in meetings with his dealers.

On market applications we explained what the markets for the chemical were, specifying the types of growers that could benefit most from this chemical—and explaining why they would benefit.

In explaining how to sell this chemical, we emphasized that the benefits of the chemical to the grower should always be stressed. We urged, too, that sales be made on the basis of quality and successful results. Finally, we pointed out that the best news about this chemical was that it made possible large savings to the grower at a relatively small investment.

All of this information was then carried by the distributors to their dealers, and, for the first time, some of the dealers were given some semblance of product training. The dealers then were armed with information that they could carry to the grower, the final step in the sales process.

While this program was far from perfect in our estimation, and we still are working on improvements for it, it was regarded as successful by most of those who participated in it. We did stabilize the distribution for this chemical, and the product was sold on the basis of quality and performance. Finally, better than 25 per cent of the tobacco acreage was treated with this chemical during 1960.

An outstanding facet of this program, I feel, is that it was accomplished through teamwork on the part of the manufacturer, the distributor and the dealer. This is the type of cooperation that must exist in the agricultural chemical industry. The day of the opportunist, the man who takes only the easy route to profit, is gone in the agricultural chemical business. If one is going to stay in the business, he has to put on his working clothes and demonstrate that he can establish a sound marketing program of his own. Promoting the future benefits of mankind, and serving the public interest through this industry, can be one of life's most rewarding experiences. ★★

C-VPFA MEETING

(From Page 35)

market MH-30. Details of this technique and a more complete report of Mr. Dennis's remarks may be found elsewhere in this issue, beginning on page 28.

A look at the future of the small farmer was provided by W. L. Turner, North Carolina State College, Raleigh, who said that there will be a greater need for control of production expenses on farms. The farmer, he said, will have to better utilize his labor

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force. Mr. Turner predicted that small farms will have to change, not so much in size because land is not available, but in terms of sales. Farmers, he declared, need more bargaining power. They must obtain more influence over what they have to sell.

What this will mean to formulators, he said, is that an educational program will be needed to keep farmers up to date on new technology. In order to utilize available land to best advantage, he explained, farmers will have to be thoroughly familiar with new and recommended varieties of seed, pesticides, fertilizers, and all production and marketing practices. In addition, he continued, farmers will have to keep up with changing state and national farm programs and participate actively in commodity groups, marketing associations, and farm organizations.

David N. Henderson, congressman-elect from the third district of North Carolina, also spoke to the group on the subject of the small farmer. He pointed out that there are more farmers in North Carolina than in any other state and that there are more farms than in any state except Texas. The agricultural chemical industry can help solve their problem, he said, not by turning them into big farmers but by providing them with the things that they need. He said that they need special pesticide formulations that can be tailored for use on small plots. Such factors as distribution of farm produce also should be improved, he said.

E. L. Chandler, manager of technical service, agricultural chemicals, Diamond Alkali Co., Cleveland, traced the development of a pesticide from the synthesis of the compound in a laboratory to large scale production and mar-

keting. He pointed out that companies have been known to withdraw promising chemicals from consideration because analytical procedures employed to determine residues sometimes become too involved.

In conclusion, Mr. Chandler urged formulators to make sure that their labels are up-to-date. He pointed out that many basic manufacturers now are revising their labels to meet FDA requirements and, in the process, some claims are being dropped. It behooves formulators, applicators, and farmers, he warned, to make sure they are working with proper labels.

John Thompson, Graham Chemical Co., Greensboro, N. C., was elected president of the Carolinas-Virginia Pesticide Formulators Association, for 1961, at the meeting. Other officers elected were: Dodson Bennett, Smith Seed & Feed Co., Danville, Va., 1st vice president; William P. Crown, Carolina Chemicals Inc., Columbia, S. C., 2nd vice president; and J. C. Whitehurst Jr., Coastal Chemical Corp., Greenville, N. C., who was re-elected secretary-treasurer.

Dr. Walter J. Mistric, North Carolina State College, Raleigh, told the group that, in the past, no one has been able to control cotton insects because no one has understood the problem. He reported that North Carolina State has developed a new program that, if followed by all growers, would result in early control of cotton insects.

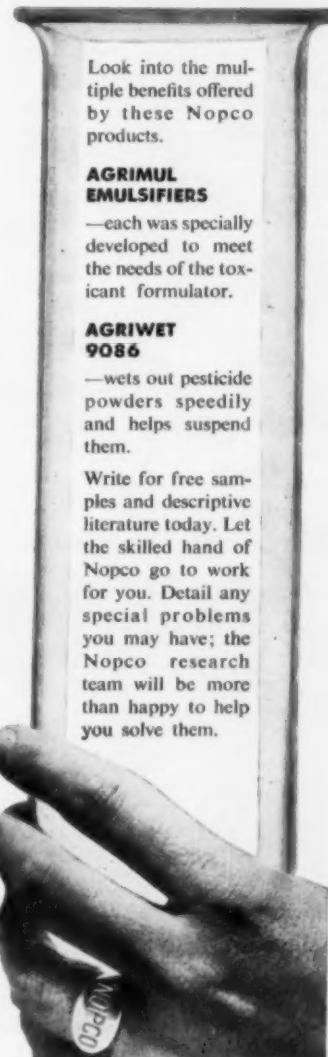
The N. C. State program is intended to standardize and simplify control methods. Included in the program are four early season applications at five-day intervals, followed by one mid-season application when five per cent of squares are infested by bollworms. On July 24, he added, applications should be resumed at five day intervals until plants stop squaring. An aphicide (ethyl parathion or Systox) must be included in the program, preferably in the last early season application and the first late season application. In addition,

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seven per cent DDT should be included in all sprays for bollworm control.

Recommended application rates are six gallons per acre of spray or 15 pounds per acre of dust. The dust must be broadcast, he said. Sprays should be applied with a fixed boom sprayer using 60 pounds of pressure. Nozzles should be placed every 20 inches and the sprayer should move at a speed of four and one-half miles per hour.★★

HORTICULTURAL MEETING

(From Page 45)

Known as 2-Pam, it has already saved the life of one Yakima Valley child, who couldn't have been saved otherwise, following accidental spray poisoning.

The child had been making mud pies with parathion, and his cholinesterase level was zero "which is very low," Dr. Zimmerman re-

lated. He expressed the hope that more 2-Pam would be available for more general use, "and that we won't have to use it."

"Don't have the false sense of security that you'll know when you're going to become unconscious, because you won't," he warned. "If you know the nature of the chemical and are intelligent enough to have a little fear, you are better off."

Probably more deaths in the United States are caused by carbon monoxide than by any other chemical compound at present, Dr. Zimmerman continued, in cautioning orchardists about the hazards of working in warehouses and packing sheds where there are gasoline motors in operation.

Some promising new materials have been developed in the organic phosphorus group for control of codling moths, Dr. Stanley C. Hoyt, entomologist at the Tree Fruit Experiment station, reported.

There are no new materials in other chemical groupings available for testing so far as he knows. Search is still continuing for something which will control codling moths without harming predators.

Tarnished plant bugs can be controlled equally effectively with Kelthane and Tedion.

The McDaniel mite appeared early in the season and built up high populations so that it was particularly difficult to control in the Wenatchee area, he added.

Improper timing of sprays to control woolly aphids has probably been the greatest difficulty with this pest, according to Charles Worthen, Naches Heights, Wash., grower, who spoke on the use of concentrate sprayers. In the dormant spray, everything was cleaned up except the McDaniel mite which moved up into the trees from the orchard floor where it had overwintered. Kelthane took care of this pest.★★

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Broad in scope, accurate, completely up-to-date, this book will be of special value to chemists, chemical engineers, plant superintendents, and to management charged with the responsibility of selecting efficient and economical processes for the production of fertilizers.

CONTENTS: The Fertilizer Industry of the United States; Nitrogen; Phosphate Ore; Phosphate Rock; Normal Superphosphate; Manufacture of Triple Superphosphates; Wet-Phosphate Acid Manufacture; Diammonium Phosphate as Produced at By-Product Coke-Oven Plants; Operating Techniques, Equipment and Practices in Manufacture of Granular Mixed Fertilizers; Manufacture of Concentrated Water; Nitrophosphates and Miscellaneous Phosphates; Thermal Processes for Producing Phosphate Fertilizers; Potash Occurrences, Processes, Production, Plan Practices in the Manufacture of Nongranulated Mixed Fertilizers; Fertilizer Materials; Liquid Fertilizers; Structural and X-Ray Data on Chemical Compounds Found in Fertilizers; Corrosion; Materials of Construction for Fertilizer Plants and Phosphoric Acid Service; Materials; Gaseous Effluence for Fertilizer Granulation Plants.

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Marketing & Development Agricultural Chemicals Chemical Specialties

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ALVIN J. COX, Ph.D.

Chemical Engineer and Chemist

(Formerly Director of Science, Government of the Philippine Islands. Retired Chief, Bureau of Chemistry, State of California, Department of Agriculture.)

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Consultant in reference to spray injury and damage, claims, including imports of fruits and nuts, formulas, labeling, advertising and compliance with law.

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NEW BRIEFS

VELSICOL CHEMICAL CORP., Chicago, has appointed H. Duane Holsapple and Glenn R. Grosch as sales representatives for the Agricultural Chemicals Division.

AC

THE H. D. HUDSON Manufacturing Co., Chicago, has appointed Sander Allen Inc., Chicago, as its advertising agency.

AC

A. W. HINES has been appointed vice-president in charge of manufacturing, and a director of Raymond Bag Corp., Middletown, Ohio, Division of Albemarle Paper Manufacturing Co., Richmond, Va.

AC

A U. S. LOAN OF \$30 million to Hindustan Chemical & Fertilizer has been approved and announced by the Development Loan Fund. Hindustan Chemicals is a government sponsored corporation. The money is to cover the foreign exchange cost of building a \$58 million fertilizer plant at Trombay, near Bombay.

AC

JOHN R. JONES has been named New York-New England district sales manager for American Potash & Chemical Corp., Los Angeles.

AC

A. EARL LEE has been appointed vice-president in charge of the newly established Marketing Division of the J. I. Case Co., Racine, Wisconsin. Mr. Lee, who had been marketing co-ordinator, assumes responsibility for all Case sales and merchandising activities, including sales, advertising, parts, service and related supporting staff functions.



In the Land of the Caribou

- The Arctic Argonauts carved out of the wilderness a modern fishing and hunting camp complete with airstrip.
- Air transportation in six hours brings twentieth century sportsmen back into the civilization of the early explorers.
- Midnight sun, howling huskies, natives and nature in the raw. Wily Arctic Grayling, surfacing Trout and the ever present Northern Pike.
- Twenty-five minutes of 16 MM sound and color film outlines the sub-Arctic life and fishing. This film is available at no charge.
- **Argosy magazine**, for the last two years has recommended our lodge as the outstanding fishing spot in Canada. United States Rubber, with its million dollar fishing vacations contest, picked the world's seven greatest fishing spots. Arctic Lodges was listed No. 1.



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Address all classified replies to Box Number, c/o Agricultural Chemicals, P. O. Box 31, Caldwell, N. J.

Rates for "Help Wanted" advertisements are 20¢ per word; minimum charge \$3.00. Rate for individuals seeking employment is 5¢ per word, \$1.00 minimum.

Advertisements of machinery, products and services accepted at rate of \$10.00 per column inch. Minimum space, one inch.

Copy closing date, 10th of preceding month.

Checks must accompany all orders.

FOR SALE

- 1—Worthington 70 cu. ft. rot. batch blender.
- 1—Raymond 66" 6-roll mill, rebuilt.
- 1—National 50" 5-roller hi-side mill, oil journals, double whizzer.
- 3—National 10' x 78" dryers, ¾".
- 2—Hardinge 8' 8" x 70" dryers, 5/8".
- 2—Davenport 8' x 60" rot. dryers, 7/16" welded shell, comb. chamber, burner.
- 1—7' 6" x 62" rotary cooler, 3/4" welded.
- 1—Louisville 7' x 70' rot. cooler, 3/4".
- 2—Bonnet 7' x 60' rot. dryers, 5/8" shell.
- 2—Bonnet 6' x 52" rotary dryers, 5/16".
- 1—Louisville 6' x 50' steam-tube dryer.
- 1—Louisville 5' x 25' steam-tube dryer.
- 2—18,000 gal. vert. alum. tanks.

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LIQUIDATION

OMAHA, NEBRASKA

- 1—Prater Blue-Streak hammermill.
- 5—Forester hammermills, size #8, 6.
- 4—Nordyke 10 x 42 roller mills, 2-roll.
- 4—Nordyke 10 x 36 roller mills, 2-roll.
- 1—Stedman 36" dia. 3-row cage mill.
- 1—Davenport #2A dewatering presses.
- 5—Bufflovak 42" x 120" dbl. drum dryers.
- 3—Shriver 48" C. I. filter presses, 50 ch.
- 2—Allis-Chalmers Inter-plane grinders.
- 2—Allis-Chalmers degenerators.

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manager, Industrial Paper Sales Division, Crown Zellerbach Corp. He had been manager of technical sales service, Multiwall Bag Sales Division.

AC

DON R. BRANCH has been named assistant sales manager of the Charlotte, N. C., sales office by F. S. Royster Guano Co., Norfolk, Va. He had been a sales representative in northeastern Mississippi.

AC

HOWARD F. KRICKL has been named to head technical sales-service at Vulcan Containers Inc., Bellwood, Ill.

AC

WILLIAM W. KOLYER has been appointed assistant district mana-

ger of the American Potash & Chemical Corp.'s eastern market development office in New York.

AC

G. DANIEL DAVIS, vice-chairman of the board of directors of Nopco chemical Co., Newark, N.J., retired recently after 44 years with the company.

AC

DR. E. W. BOLL-JONES has been appointed to the European staff of the Sulphur Institute as assistant to the vice-president. Dr. Boll-Jones had been with the agricultural marketing division of Shell International Chemical Co.

AC

ESCAMBIA CHEMICAL CORP., New York, has been awarded a Silver Plaque by Ebasco Services Inc., New York, for posting a safety record during 1960 that was 58 per cent better than the chemical industry average.

AC

JACK D. RICE has been elected a vice president of Koppers Company, Inc., Pittsburgh, Pa.

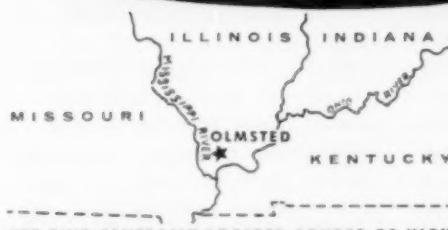
AC

HERBERT A. GOULD has been named district manager at Albany, N. Y., by the United States Gypsum Co., Chicago. He joined the company in 1950.

AC

DR. IRVIN M. WORFORD, director of agronomy for Southern Nitrogen Co., Savannah, Ga., has been elected president of the University of Georgia's agricultural college alumni association.

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Mulhern Named By Bemis

Andrew J. Mulhern has been named to succeed Erik A. Johnson as general traffic manager for the Bemis Bro. Bag Co., St. Louis. Mr. Mulhern had been assistant general traffic manager for the past nine years. Mr. Johnson, who has been with the company for 40 years, will retire on Jan. 31.

Armour Fertilizer Div. Changes

Several appointments in the various divisions of Armour Agricultural Chemical Company have been announced by H. Vise Miller, company vice-president and general manager of the firm's Fertilizer Division.

A. W. Chandler has been appointed manager of the Greens-

boro, N. C. Division, succeeding H. H. Kemp, who is retiring.

N. D. Odom is named assistant manager in the Memphis, Tenn., Division. M. E. Stambaugh, is assistant manager of the Carteret, N. J. Division.

S. C. Evans is appointed assistant manager of the Baltimore, Md., Division. O. M. Troyer is branch manager of the Centralia, Mo., Division. D. P. Brunetti is supervisor of specialty sales in the Carteret Division.

August Kochs Dies

August Kochs, founder of Victor Chemical Works and vice chairman of the board at Stauffer Chemical Co. died Nov. 21 in Chicago. He was 89 years old.

Renneburg Research and Development Center Completed

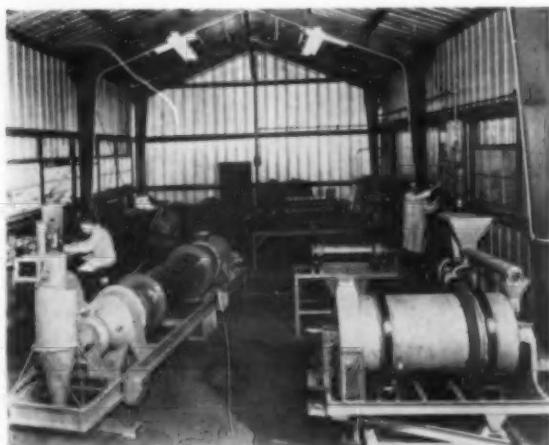


Photo shows a portion of the facilities available in the new research and development center recently completed in Baltimore, Md., by Edw. Renneburg & Sons.

TO keep pace with the growing demand for product and pilot pre-testing, Edw. Renneburg & Sons, Baltimore, Md., have recently completed their new Research & Development Center. Located near their main plant at 2639 Boston Street in Baltimore, the new Center includes a modern product testing laboratory and pilot plant facilities. Here, variables in blending, granulating, liquid extraction, drying, and calcining are solved.

Variations in pilot dryer pre-testing are achieved by specially designed and constructed units that permit the rearrangement and

modification of lifting and distributing flights, air handling systems, and furnace system to other working parts. The performance and results of any type of rotary and flash dryer can be duplicated at the Renneburg Research & Development Center. Scaleup data and operational procedures are obtained and the best method of processing a product is recommended.

Self-contained, portable, semi-production pilot unit operations are available for purchase or rental for pre-test runs of materials at a customer's own plant site.

Niagara To Build

A plant for production of agricultural pesticide formulations will be built at Opelousas, Louisiana, by the Niagara Chemical Division of Food Machinery and Chemical Corp., Middleport, N. Y.

The unit will be designed to meet the pesticide needs of southern and central Louisiana, and will turn out a wide range of pesticide materials. Among the products which the plant will produce are formulations of DDT, Endrin, Methyl Parathion, Malathion, Heptachlor, ethion, Thiadan insecticide and Tedion miticide.

The plant — a steel structure with concrete foundation — will contain more than 16,000 square feet of production, warehouse and office space. It will incorporate the most modern equipment for the blending and mixing of liquid, dust, and granular formulations. Liquid production facilities will be installed outdoors.

John Camara, currently serving as office manager at Niagara's Greenville, Mississippi, plant, has been appointed to serve as plant manager when the Opelousas facilities are completed. This will be sometime around mid-February, 1961.

Calspray NH₃ Plant in Iowa

California Chemical Company, a subsidiary of Standard Oil Company of California, has announced the awarding of a contract to the Bechtel Company for the construction of an ammonia plant at Fort Madison, Iowa. The plant is expected to be completed in late 1961 or early the following year.

Correction

An item on page 73 of the November, 1960, issue of *Agricultural Chemicals* reported that Malathion was the chemical used in a series of fall boll weevil control experiments conducted last fall in several southern states by the USDA. Actually, the material used was Methyl Parathion. *Agricultural Chemicals* regrets the error.



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TALE ENDS

IN our Army days, whenever an officer complained about the food it was standard procedure to place him in charge of the mess hall. Much the same sort of thing appears to have taken place in President-elect Kennedy's choice of a Secretary of Agriculture, a post of which a recent former secretary (not Mr. Benson) has said "I wouldn't wish it on my worst enemy." Governor Freeman, the incoming Secretary, has been aligned with some of Secretary Benson's most severe critics. In fact, Mr. Benson blames the Democrat-Farmer-Labor party, of which Gov. Freeman is a leader, and the National Farmers Union, which is strong in Minnesota, for attacks that made the present Secre-

tary the Republican party's chief farm liability. Now the tables are reversed and if Gov. Freeman expects to push Senator Kennedy's farm program, involving some of the tightest controls yet devised, he will be attacked by such right-wing farm organizations as the American Farm Bureau Federation. It is no surprise, therefore, that Senator Kennedy was hard-pressed to find a Secretary of Agriculture.

AC

In recent months, persons speaking in favor of agricultural chemicals before regulatory and farm groups have been stressing the fact that it costs an average of \$1 to 2 million to bring a

new pesticide to market. Even this figure, however, seems small indeed when compared with the investment being made by one company which is constructing a huge plant for the sole purpose of manufacturing a promising new pesticide which has been extensively tested in the cotton-growing areas of the South and Southwest.

AC

Two years ago, the residents of a Northern Illinois city turned down a referendum that would have provided the funds necessary to protect 6,000 elm trees from Dutch elm disease. The people now are being asked to provide the same amount of money for the purpose of removing 6,000 dying elm trees. Opponents of the bill two years ago said that spraying might kill the birds. What they didn't take into account was that the birds will leave anyhow if there are no trees. The residents are finding this out, however.

AC

Ammonium nitrate is winning increasing use as a high explosive. International Minerals & Chemical Corp. finds it costs only about \$11.76 to blast a section of potash ore with the chemical, compared to \$20.46 with dynamite. Total industry use of ammonium nitrate as a high explosive has jumped to around 300,000 tons this year from 37,000 in 1953 and continues to mount.

AC

An 1870 booklet by Liebig and Gibbon, found in the files of Grayson Morris at Southern States, (fertilizer manufacturers) includes the following analysis of a fertilizer. Grayson observes that the variation in analysis of the same fertilizer by two contemporary chemists is not unlike the reports of present day chemists. He also observes that the methods of analysis apparently haven't improved much in the past 100 years.

Liebig Ammoniated Superphosphate is a standard goods, and one of the best Tobacco Fertilizers upon the market, as can be seen from its analysis here-with, made by one State Chemist, Dr. GACOYNE, and Dr. LINSKI; and those who have used, and are using the ordinary brands of tobacco fertilizers will find it to their interest to use the *Liebig Ammoniated*, because it is cheaper. We desire to have it used alongside anything upon the market, our very highly ammoniated A No. 1 included. It shows—

	Dr. W. J. Gacoyn.	Dr. S. A. Linski.
Ammonia,	2.31%	2.07%
Available Phos. Acid,	10.39%	9.00%
Insoluble Phos. Acid,01%	1.41%
Potash (K ₂ O),	3.38%	3.40%

AC

Being in the writing business we perhaps tend to attach too much importance to words, and their abuse and misuse. High in our list of word crimes comes the ceaseless repetition of those meaningless pseudo-clever, big time, catch phrases like "head-up," "kick-off," "programming," "finalize," etc., that are so popular among the Madison Ave. Brigade. Writers in the ag field have been developing a few flagrant offenders of their own in this department. In self defense, we are initiating a campaign here and now to have no more of "food and fiber" or "agribusiness." Enough!

AGRICULTURAL CHEMICALS

A TYPICAL AGRICULTURAL CHEMICALS SUBSCRIBER TELLS

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"I have been reading AGRICULTURAL CHEMICALS for years and look forward to receiving each monthly issue with the same enthusiasm as the householder looks forward to receiving his daily newspaper. The articles are timely and helpful for any person in the fertilizer industry. The magazine does a wonderful job in covering all the phases of the chemical and fertilizer fields and has provided me with practical information which I have applied in my work as plant manager. The advertising in this magazine is well presented, I would hate to do without AGRICULTURAL CHEMICALS."

Mr. Reichard is Treasurer and Plant Manager of Robert A. Reichard, Inc., Allentown, Pennsylvania. The Company has been in business over 50 years and manufactures conventional, granular, and complete liquid fertilizers for eastern Pennsylvania and the north western part of New Jersey. The dry fertilizer plant is located in Allentown, while the liquid fertilizer plants are located in Allentown and Harrisburg, Pennsylvania. The Company also is a jobber for a full line of insecticides, and herbicides.

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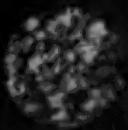
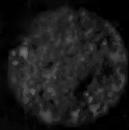


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★ ★ ★

SAFETY, SYNERGISM AND SALES APPEAL THAT'S BUTOXIDE!!



The most extensive laboratory and field tests ever conducted on an insecticide by any company proved piperonyl butoxide's unique low order of toxicity which resulted in tolerances and official clearances not yet given to any other insecticide and its use with pyrethrins. Rats were fed piperonyl butoxide with all the food that they consumed from time of weaning through the normal lifespan and through three successive generations. Amount of chemical (right) is mixed with rat's weekly food ration contained in glass beaker.

TESTS PROVE BUTOXIDE'S LOW TOXICITY

Years of testing insecticide chemicals in Fairfield's research laboratories prove butoxide's unique low toxicity.

In addition, chronic feeding studies were conducted with rats, dogs, goats and monkeys. Cattle were sprayed twice daily throughout the season with butoxide and pyrethrins for four years. Not a trace of butoxide appeared in samples of the cattle's muscle, fat or milk. This resulted in clearance for use of butoxide and pyrethrins on dairy animals.

Laboratory tests made 14 years ago showed DDT's oral LD₅₀ for rats is 200 mg/kg. At the same time the oral LD₅₀ of undiluted piperonyl butoxide for rats was found to be approximately 8,750 mg/kg. Thus, towards rats, Fair-

field's butoxide was only 1/43rd as toxic as DDT. By the time the toxicological studies were completed, it was found that the MLD₅₀ for butoxide greatly exceeded the earlier reports. More recent work completed on chronic tests with piperonyl butoxide, completely satisfied the federal regulatory authority for their tolerances and clearances. At the present time all tolerances are based on chronic feeding tests.

For the formulator and manufacturer, Fairfield's butoxide, thus, plays an important role in producing insecticides with greater safety and salability... whether they are products for home, farm or industry. Consult your local Fairfield representative for further information or write today to Fairfield sales headquarters.

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION

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Fairfield Development Boosts Insecticide Performance

Butoxide, the best known and the most famous of all insecticide synergists, is a Fairfield research development. It gives insecticide formulators and manufacturers a more effective product... and it saves them money.

Piperonyl butoxide has the unique ability of tremendously increasing the insect killing power of certain chemicals.

For example, 0.125% by wt. of pyrethrins—though seldom used alone today—when applied against houseflies has a mortality of 43%. Cost is approximately \$0.07 per pound.

But then add Fairfield's piperonyl butoxide and see what happens. A combination of 0.03% pyrethrins and 0.25% piperonyl butoxide applied against houseflies produces a striking 82% mortality. Cost of the butoxide and pyrethrins combination is \$0.03 per pound. Quite a difference in both effectiveness and in price—doubled performance at half the cost!

The surging increase in effectiveness is the result of synergism, an action that takes place inside the insect's body. It produces the remarkable kill required in a popular, fast-selling insecticide.

There are other advantages too. Piperonyl butoxide is not only stable, but it acts as a stabilizer for certain other chemicals by reducing the effects of light, air and heat. It screens out deteriorating ultra-violet rays, thus, prevents deterioration of pyrethrins.

And because it is an acid acceptor, it retards decomposition and polymerization of pyrethrum. Since butoxide is also a solvent, it generally makes the addition of other solvents unnecessary—an important consideration when an odor-free product is desired.

And butoxide's synergizer-stabilizer role applies whether the chemical is pyrethrins, allethrin or rotenone.

What this all means is that butoxide puts greater effectiveness into a product and makes it last longer—on the shelf and after it has been applied by the user.



